

ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY
LEWIS STEPHEN PILCHER, M.D., LL.D.,
OF NEW YORK.

WITH THE COLLABORATION OF

J. WILLIAM WHITE, M.D., LL.D.
OF PHILADELPHIA,
Professor of Surgery in the University
of Pennsylvania.

SIR WILLIAM MACEWEN, M.D., LL.D.
OF GLASGOW,
Professor of Surgery in the University
of Glasgow.

SIR W. WATSON CHEYNE, C.B., F.R.S.,
OF LONDON,
Professor of Surgery in King's College.

VOLUME LV
JANUARY—JUNE, 1912

PHILADELPHIA
J. B. LIPPINCOTT COMPANY
1912

COPYRIGHT BY
J. B. LIPPINCOTT COMPANY
1912

2

(M)

CONTRIBUTORS TO VOLUME LV.

- ALEXANDER, EMORY G., M.D., of Philadelphia, Demonstrator of Fracture Dressings, Jefferson Medical College and Woman's Medical College; Assistant Surgeon, Kensington Hospital for Women; Surgeon to Out-Patient Department, Episcopal Hospital, and Children's Hospital, Mary J. Drexel Home.
- BALFOUR, DONALD C., M.B. (Tor.), of Rochester, Minn., Associate Surgeon to St. Mary's Hospital.
- BARTLETT, WILLARD, M.D., of St. Louis, Mo.
- BECKMAN, E. H., M.D., of Rochester, Minn., Assistant Surgeon to St. Mary's Hospital.
- BERNHEIM, BERTRAM M., M.D., of Baltimore, Md., Assistant in Surgery the Johns Hopkins University.
- BLOODGOOD, JOSEPH C., M.D., of Baltimore, Md., Associate in Surgery in the Johns Hopkins University.
- BOOTHBY, WALTER M., M.D., of Boston, Mass.
- BRICKLEY, W. J., M.D., of Boston, Mass., Resident Surgeon in the Haymarket Square Relief Station.
- BROWN, ALFRED J., M.D., of New York, Demonstrator of Anatomy, College of Physicians and Surgeons, Columbia University; Clinical Assistant, Department of Surgery, Vanderbilt Clinic.
- COBB, FARRAR, M.D., of Boston, Mass., Assistant Visiting Surgeon to the Massachusetts General Hospital.
- COLLINS, HOWARD D., M.D., of New York, Surgeon to the City and J. Hood Wright Memorial Hospitals.
- COTTON, F. J., M.D., of Boston, Mass., First Assistant Surgeon in the Boston City Hospital.
- CULVER, GEORGE D., M.D., of San Francisco, Cal.
- DA COSTA, JOHN CHALMERS, M.D., of Philadelphia, Gross Professor of Surgery in Jefferson Medical College.

- DAVIES, H. MORRISTON, M.C. (Cantab.), F.R.C.S., of London, Associate Surgeon, University College Hospital.
- DOUGLAS, JOHN, M.D., of New York, Visiting Surgeon, Bellevue Hospital; Assistant Surgeon, St. Luke's Hospital.
- DRUMMOND, HAMILTON, M.B., of Newcastle-on-Tyne, Surgical Registrar, Royal Victoria Infirmary of Newcastle.
- EHRENFRIED, ALBERT, M.D., of Boston, Mass.
- EISENDRATH, DANIEL N., M.D., of Chicago, Ill.
- ELIOT, ELLSWORTH, JR., M.D., of New York, Surgeon to the Presbyterian Hospital.
- ELSBERG, CHARLES A., M.D., of New York.
- FINNEY, JOHN M. T., M.D., of Baltimore, Md., Associate Professor of Surgery in Johns Hopkins University.
- GIBBON, JOHN H., M.D., of Philadelphia, Professor of Surgery in Jefferson Medical College; Surgeon to the Pennsylvania Hospital.
- GIBSON, CHARLES LANGDON, M.D., of New York, Surgeon to St. Luke's Hospital.
- GIFFIN, H. Z., M.D., of Rochester, Minn., Attending Physician to St. Mary's Hospital.
- HIBBS, RUSSELL A., M.D., of New York.
- HITZROT, JAMES MORLEY, M.D., of New York, Associate Surgeon, New York Hospital; Assistant Surgeon, Bellevue Hospital.
- HOMANS, JOHN, M.D., of Boston, Mass., Assistant in Surgery, Harvard Medical School; Surgeon to Out-Patients, Massachusetts General Hospital.
- HORSLEY, J. SHELTON, M.D., of Richmond, Virginia.
- HUDSON, WILLIAM H., M.D., of Atlanta, Ga.
- KÖRTE, PROF. DR. W., of Berlin, Germany, Surgical Director of the Krankenhaus am Urban.
- LERCHE, WM., M.D., of St. Paul, Minn.
- LUSK, WILLIAM C., M.D., of New York, Assistant Visiting Surgeon to St. Vincent's Hospital.

CONTRIBUTORS TO VOLUME LV.

v

LYLE, HENRY H. M., M.D., of New York, Instructor in Operative Surgery in the College of Physicians and Surgeons of Columbia University; Associate Surgeon, St. Luke's Hospital.

MACCARTHY, WILLIAM CARPENTER, M.D., of Rochester, Minn.

MCGRATH, BERNARD F., M.D., of Rochester, Minn.

MCWILLIAMS, CLARENCE A., M.D., of New York, Assistant Surgeon to the Presbyterian Hospital.

MARK, ERNEST G., M.D., of Kansas City, Mo., Attending Genito-urinary Surgeon to Kansas City General Hospital.

MARTIN, FRANK, M.D., of Baltimore, Md., Clinical Professor of Surgery in the University of Maryland.

MAYO, CHARLES H., M.D., of Rochester, Minn.

MAYO, WILLIAM J., M.D., of Rochester, Minn.

MONTGOMERY, DOUGLASS W., M.D., of San Francisco, Cal.

MORRIS, ROBERT T., M.D., of New York, Professor in Surgery at the New York Post-Graduate Medical School.

MOSCHCOWITZ, ALEXIS V., M.D., of New York, Visiting Surgeon, Har Moriah Hospital; Associate Surgeon, Mount Sinai Hospital.

MÜLLER, GEORGE P., M.D., of Philadelphia, Associate in Surgery to the University of Pennsylvania; Surgeon to St. Agnes' Hospital.

MUMMERY, P. LOCKHART, B.C., (Cantab.), F.R.C.S. (Eng.), of London, Senior Assistant Surgeon, St. Mark's Hospital for Diseases of the Rectum; Surgeon, Queen's Hospital for Children.

NASSAU, CHARLES F., M.D., of Philadelphia.

PANCOAST, HENRY K., M.D., of Philadelphia.

PILCHER, LEWIS STEPHEN, M.D., of Brooklyn, N. Y.

POOL, EUGENE H., M.D., of New York, Assistant Surgeon, French Hospital; Associate Attending Surgeon, New York Hospital.

RICHARDSON, MAURICE H., M.D., of Boston, Mass., Surgeon-in-Chief, Massachusetts General Hospital; Moseley Professor of Surgery, Harvard University.

ROBINSON, SAMUEL, M.D., of Boston, Mass., Surgeon to Out-Patients, Massachusetts General Hospital; Visiting Surgeon at the Harvard Clinic.

ROSS, GEORGE G., M.D., of Philadelphia, Surgeon to the Germantown and Stetson Hospitals; Assistant Surgeon to the German and University of Pennsylvania Hospitals.

SKILLERN, PENN G., JR., M.D., of Philadelphia.

SPEESE, JOHN, M.D., of Philadelphia, Instructor in Surgery in the University of Pennsylvania.

STEWART, LEVER FLEGAL, M.D., of Philadelphia, Resident Physician to the German Hospital.

TAYLOR, WILLIAM J., M.D., of Philadelphia.

WARTHIN, ALDRED SCOTT, M.D., of Ann Arbor, Mich., Professor of Pathology in the University of Michigan.

WILSON, GEORGE H., M.D., of Ann Arbor, Mich., Formerly Staff Assistant in Pathology, in the University of Michigan.

WILSON, LOUIS BLANCHARD, M.D., of Rochester, Minn., Director of Laboratories, St. Mary's Hospital.

ANNALS OF SURGERY

VOL. LV

JANUARY, 1912

No. 1

ORIGINAL MEMOIRS.

SURGICAL ASPECTS OF MEMBRANOUS PERICOLITIS.

BY LEWIS STEPHEN PILCHER, M.D.,
OF BROOKLYN, N. Y.

AMONG the surgical problems at present under discussion, much interest attaches to the effect upon intestinal peristalsis of certain membrane-like films, which in certain cases are found during exploration of the abdomen covering to a greater or less extent the cæcum and ascending colon. Over most of the areas in which such formations exist they appear as a thin veil-like film, but in some cases at certain limited areas a much more positive fibrous proliferation may be found to be present, producing distinct band-like conditions; these may very materially restrict the expansibility of the intestinal wall, or even bind down the gut at some point so closely as to positively narrow its lumen. The presence of such a membranous new formation at the caput cæci may so bind down the appendix as to markedly angulate it and lead to subsequent degenerative changes in its walls, or may so pull down and fix the terminal portion of the ileum as to interfere with the normal delivery of the fecal content of the ileum into the cæcum (Figs. 1, 5, 9, and 10).

For the first clear description of the pathological considerations and clinical relations of this condition, credit must be given to Dr. Jabez N. Jackson, in a paper read by him so

recently as December, 1908 (*Surgery, Gynecology and Obstetrics*, September, 1909, p. 278). Jackson in his paper very justly remarks that he was sure that this condition had been observed, possibly frequently, by every surgeon of experience. Nevertheless it had not been either properly described from the pathological side or recognized as a clinical entity, neither had it received any special surgical consideration.

Lane, in his paper on chronic constipation, which was published in the same journal in February, 1908, practically describes the condition under consideration, characterizing it as consisting of the development of adhesions between the outer aspect of the large bowel and the peritoneum covering the abdominal wall in its vicinity. This formation, he says, is most apparent at the first instance in the cæcal portion, and gradually extends to the termination of the large intestine. The development of these films and bands of adhesion is considered by him as the sequel of long existing enteroptosis by which has been awakened some increased hypertrophic tendency in the strained fibres of the proper membranous anchors of the bowel, with results that, while they are compensatory as far as the ability to support strain is concerned, they are in some cases pathological in the degree to which they interfere with the normal peristalsis of the bowel.

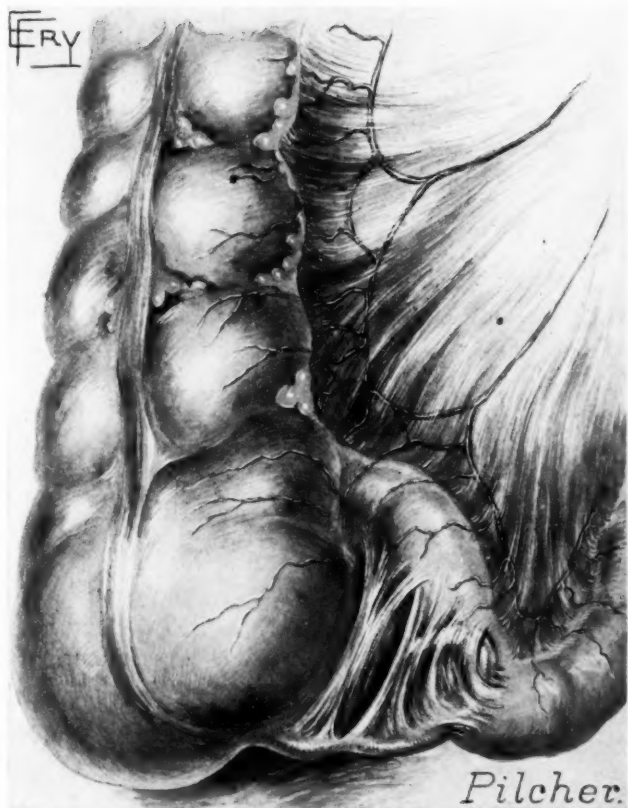
Charles Mayo, in a recent paper (Collected Papers, vol. ii, p. 221), suggests that these bands and films may be due in some cases to the "late rotation of the bowel and descent of the cæcum from its hepatic position after the formation of the parietal portion of the peritoneal cavity in the infant."

He adds, however, that he has observed many cases in which a definite kink of the ileum, within a few inches of its termination, was evidently a condition of inflammatory origin.

Gerster (*ANNALS OF SURGERY*, September, 1911, 325) regards them as the result of infectious processes associated with chronic colitis.

Since my attention has been called to this condition by these writings and the observations of my sons, Drs. Paul and James Pilcher, I have looked for it, and having learned to recognize it, I have found it to be by no means a

FIG. 1.



The simpler and more common disposition of adhesion bands binding appendix, caecum and ileum together.

1901

rare condition. I am sure that I had seen it repeatedly in past years, but my eyes had been closed so that I had not appreciated its meaning nor its relations to the symptoms for the relief of which my efforts were being exerted.

As to the *etiology* of these films and bands, that view which considers them to be *the result of long-continued or oft-repeated mild infections of the peritoneal covering of the cæcum and appendix* transmitted through the intestinal wall seems to me most probable. No one who has operated many times for the removal of the appendix can have failed to note the frequent co-existence of a more or less extensive, and a more or less intense, congestion of the cæcal peritoneum, a true typhlitis.

Thus, for example, in a woman under our care during the past year, who had suffered for six weeks from the symptoms of a subacute appendicitis, when she was operated upon an elongated, thickened, and congested appendix was indeed exposed and removed, but more, and of especial interest in this connection, the peritoneal surface of the adjacent cæcum also was much congested and was covered with a thick membranous film.

I have long appreciated that in occasional instances this co-existing perityphlitis and pericolitis was a more important pathological entity than the appendicitis itself.

In the cases which form the chief basis of the present communication, the history clearly indicated in each case that a pre-existing local infection was the cause of the films, which operation demonstrated to be present as a part of the morbid changes which had taken place.

The *symptoms* which such pericolic membraniform new formations may produce will depend upon the degree of interference which they occasion with the proper function and circulation in the part. Though they may vary much in detail they will still have a general similarity. Discomfort, increasing at times to positive pain, in the right iliac region is quite constantly present. Deep pressure in this region will elicit tenderness. Exacerbations of this tenderness due to matters of diet or exercise occur from time to time, accom-

panied by colicky cramps, significant of paroxysms of muscular spasm in the bowel musculature.

Fecal stasis to a varying degree is the result of various factors which combine in many different degrees, at various times and in different cases, to interfere with the onward progress of the intestinal content. These are:

(a) Defective peristalsis due to the manner in which the bowel is hampered and confined by a broad enveloping film, or tied down by stronger and more distinct bands and adhesions; (b) Real obstruction due to a diminution of the bowel's lumen by constricting bands or sharp angulations; (c) Enterospasm, a variable, uncertain, and possibly transient but recurrent factor. The constant fretting of the affected segment of the gut in its efforts to do its work and the irritable condition of the wall of the gut predispose to the production of muscular spasm. Such spasm increases for the time obstruction and aggravates the local pain and tenderness. (d) Autointoxication: A long train of multiform general symptoms springs from the defective fecal drainage, more or less marked according to the avidity of the absorbents of the imperfectly drained segment and the special resisting power of the individual. The condition is quite different from that of ordinary constipation, in which the more or less dehydrated fecal matter is retained in the descending colon and sigmoid flexure, where the provisions for bacterial changes and for absorption are at a minimum. Into the cæcum and the adjacent ascending colon pour the fluid contents of the ileum; intestinal bacterial activity is here at its highest point, the supply of organic material in the most favorable condition for putrescent changes is continuous, the absorbents are abundant and active; drainage from this portion of the intestine should therefore be always adequate and prompt, and whenever it is interfered with, the symptoms of autointoxication become at once a prominent element in the symptom complex that attends the condition.

The systemic symptoms produced by the autointoxication caused by defective cæcal drainage may in fact so dominate the situation that the less strongly accentuated local symptoms

may be quite overlooked, or accepted as of little importance. The essential element, however, is the fecal stasis in the cæcal region. The vicious train begins with chronic pericolicitis, includes next constricting bands and restraining films, then fecal stasis develops, then autointoxication ensues, and finally neurasthenia in some of its many forms crowns the process.

Pain may be felt in and often is referred to the stomach, and the secondary gastric distress and digestive disturbance may be so marked as to be considered as primary both in time and importance. The teaching, that in all cases of chronic gastric disturbance the condition of the cæcum and its appendix should be carefully inquired into, is eminently sound, for in a considerable proportion of such cases in the latter region is to be found the root of the disorder.

Kidney Complications.—Renal irritation and ultimate chronic nephritis may be a sequel to the long-standing cæcal stasis and should not be overlooked. It has been demonstrated by Franke (*Coliinfektion der Harnwege, Mittheilungen aus den Grenzgebieten der Med. und Chir.*, No. 4, pp. 511-674) that the cæcum and ascending colon are connected by a train of lymphatics with the right kidney. He further states that bacteria are able to pass directly from the intestine into the lymph-vessels if there is even a slight lesion of the intestinal wall. That there are produced by these micro-organisms inflammatory lesions of the wall severe enough to cause the production of a thickened tissue externally (membranous pericolicitis) is evidence that such transmigration of the bacilli through the wall and into the surrounding lymph spaces does take place not infrequently. That some pathologic conditions of the kidney are directly consequent to precedent pathologic changes in the cæcum and ascending colon seems to be exemplified in such cases as the following in our series:

CASE I.—The patient was a lady who had for some time suffered from obstinate constipation. Two months before examination, after some unusual exertion, she began to suffer from severe cramps across the lower abdomen. The pain, after several days' duration, finally limited itself to the right side of the

abdomen in its lower quadrant. Several days subsequently, sharp stabbing pains referred to the right costovertebral angle began to be complained of, and at this point there was marked tenderness. During the succeeding weeks she suffered from a frequency of urination, and at times the tenesmus of the bladder was practically continuous. The urine contained a slight amount of pus, a trace of albumin, and numerous granular casts.

Cystoscopic examination showed an open dilated ureter ostium on the right side, the left being normal. The phenolsulphonephthalein reaction showed a delay of function in the right kidney of 29 minutes, the left being normal 10 minutes.

Operation, three months after the onset of the patient's complaint, revealed a chronic appendicitis and pericolic adhesions, with right kidney markedly congested and surrounded by a zone of perinephritic infection of recent development and in an acute stage.

CASE II.—A woman, twenty-four years of age. Had been suffering for several years from progressive constipation without any noticeable constitutional effects. Twelve weeks before examination by us she was seized with an acute pain referred to the right side. Its duration was brief and was accompanied by the passage of blood in the urine. It recurred at intervals subsequently, and radiated down the course of the right ureter to the labium. At various times she continued to pass small amounts of blood in the urine. There was a moderate frequency of urination during the day. Pus was reported in the urine by her physician during these attacks. Her chief complaint was continued pain in the back and painful urination. After cystoscopic examination elsewhere she was advised to have the right kidney removed, although repeated X-ray examination failed to show any stone. She now came under our care. Renewed cystoscopic examination showed a right-sided œdema of the trigone, leading directly up to the right ureter opening, which, however, was normal. Catheterization of the right ureter showed in the urine obtained an excess of renal cells, a few red blood-cells, but no pus. Vaginal examination elicited a tender point on the right side corresponding to the position of the ovary, pressure upon which caused the same pain which the patient had previously complained of. Abdominal palpation elicited a moderate tenderness over the region of the appendix and cæcum.

The previous advice of direct approach to the kidney was disregarded and a median suprapubic incision undertaken. The

right ovary was found markedly diseased and the right tube much congested and thickened. The appendix was the seat of a chronic inflammation of subacute type and was removed. The cæcum and ascending colon were further found to be covered by a definite film of inflammatory new formation, which was dissected off. Convalescence was uneventful, and after the second day up to the present time no further subjective sensations referable to the kidney have been remarked by the patient, and the urinary secretion became quickly normal.

To these particular cases which have come to operative demonstration, I would add the observation of our associate in radiography, Dr. Charles Eastmond, who informs us that he has noticed in many patients sent to him for kidney pictures, cases in which renal pain had caused suspicion of the presence of stone in the kidney, that in those cases in which the X-ray reveals no evidences of stone present in the kidney it was noticeable that in many the cæcum and ascending colon were markedly dilated and that also in many instances the kidney was lower than normal.

The anatomical fact that the lymphatic connections of the cæcum and ascending colon with the right kidney are such as to make possible the infection of the kidney from the cæcum and colon under certain conditions, this fact, I say, is of sufficient importance to lend additional gravity to the existence of the colonic condition. Too much stress cannot be placed upon the fact that in an individual case the right portion of the large gut and the right kidney may both be diseased, and that unless careful examination be made the pathologic condition involving the alimentary canal is likely to be overlooked, although it is the primary causative factor. In such a case an attack upon the kidney alone, from which the major complaint arises, would still leave conditions that would make the result imperfect. Persistent pain, referred subjectively to the right kidney, with some pus and blood and casts in the urine, with negative X-ray findings as to stone in the kidney and positive evidence of cæcal stasis, should suggest active efforts to relieve the latter as the condition of fundamental importance.

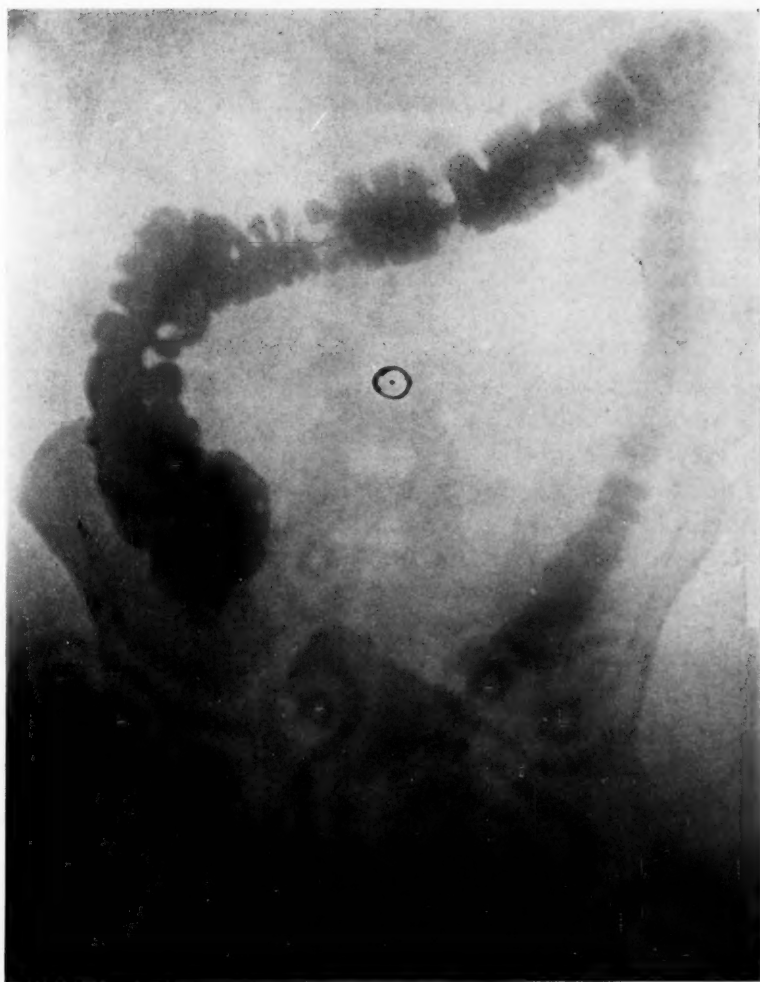
Diagnostic Use of the X-ray.—In case of chronic pain in the right iliac region, associated with intestinal disturbances, skiagraphs of the cæcum and colon, filled with a bismuth emulsion, are of great assistance in arriving at a positive diagnosis. The clear manner in which the colon can thus be outlined and its course traced is extremely striking. By aid of the bismuth filling the location and degree of a constriction, the presence of an angulation and the amount of ptosis, if any, can be plainly declared.

We present herewith reproductions of a number of skiagraphs so obtained, the special features of which are detailed in the legends attached to the several plates (Figs. 2, 3, 4, and 8). The skiagraphic work in these cases has been done by Dr. Charles Eastmond.

The technic of this bismuth meal is as follows: The bowels having been emptied during the day by a dose of castor oil, the patient is given at ten o'clock in the evening a mixture containing from two to four ounces of bismuth subcarbonate, the amount to be determined by the size and weight of the patient. To this is added six ounces of mucilage of acacia, and the quantity thus obtained made up to sixteen ounces with top milk, which serves to disguise the insipid taste of the bismuth and the acid taste of the acacia. The patient then reports to the radiographer the following morning at nine o'clock, after an approximate interval of twelve hours, at the end of which time it will usually be found that most of the bismuth emulsion has passed the terminal ileum and has already filled the first part of the big gut. Subsequent exposures must be determined according to the degree to which the bismuth is found to have progressed along the bowel at the first examination. In many cases a supplementary enema of bismuth is administered through a short rectal tube. Observation shows that the emulsion is carried around to the cæcum within four or five minutes by retrograde peristalsis. By combining the two methods a good demonstration of the entire large intestine can be secured (see Fig. 2).

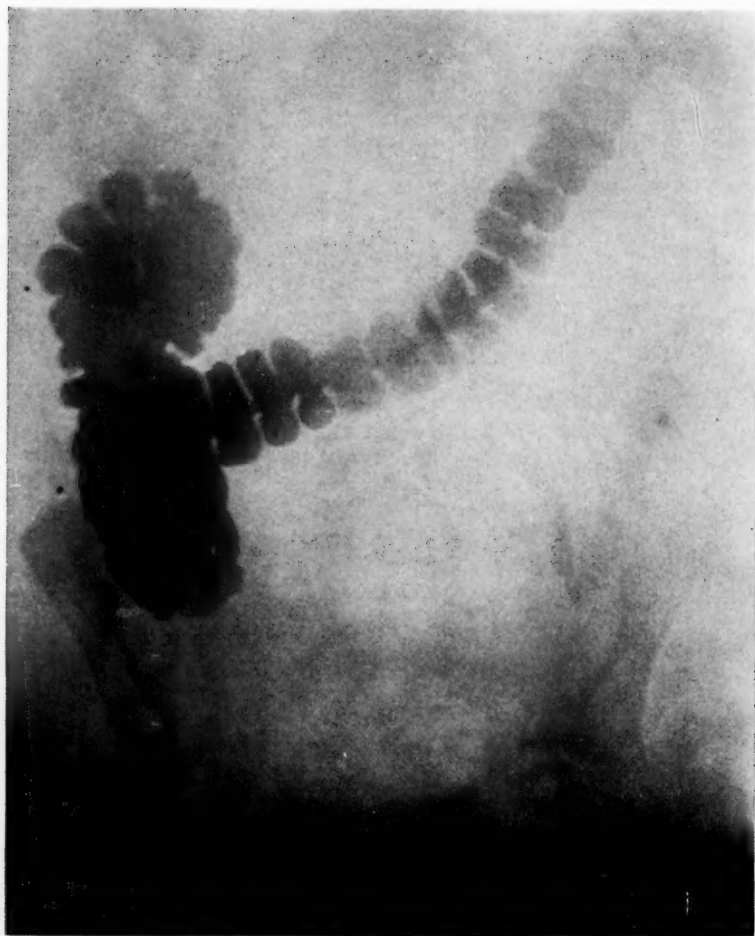
Position of the Cæcum and Colon.—Necessarily some familiarity with the location and appearance of the normal

FIG. 2.



The normal colon. Skiagraph taken 12 hours after the ingestion of bismuth emulsion, supplemented by an enema of the same given 10 minutes before the photograph was made. Note the position of the cæcum in the concavity of the iliac fossa; note the oblique manner in which the transverse colon crosses the abdomen about the level of the umbilicus upward to the splenocostal region on the left; note the sharp angle at the splenic flexure which is typical; note the crumpled folds of the sigmoid flexure in the superior pelvic strait. The position of the umbilicus is indicated by the circle. Skiagraph presented as a standard for comparison.

FIG. 3.



Reduplication of colon by film binding ascending colon and first portion of the transverse together. Position of cæcum somewhat higher than normal; sharp ascent of transverse colon as it passes to the splenocostal region.

N.B. In this case the dominant symptoms were those of obstruction at the splenic angle. At this point, on opening the abdomen was found a constricting band encircling the colon which had been formed by an epiploic appendage whose tip had been thrown around the bowel and adhered to the mesocolon so as to form a circular loop around it. The peritoneal surface of the transverse colon proximal to the point of constriction was congested and presented an incipient membranous film, presumably the early stages of the formation which in a more advanced development had bound the two segments of the colon together in the right iliac region.

intestine, when filled with bismuth mixture, is requisite in order to satisfactorily interpret the X-ray picture. The course and relations of a normal colon are well shown in Fig. 2. The cæcum is seen to be situated well above the brim of the pelvis. When the colon is ptosed, the cæcum may lie near the brim, and in severe cases may hang over into the true pelvic cavity. The hepatic flexure is found at or above the level of the umbilicus. The most constant point of fixation of the colon is at the splenic flexure where the intestine is attached by the short phrenocolic ligament to the left abdominal wall under the spleen. This is the highest attachment of the colon, and to this point the transverse colon normally ascends for some inches and there makes a sharp bend downward, so that portions of the transverse and the descending colon normally lie parallel to each other in close contact for some inches.

Exploratory Incision as a Means of Diagnosis.—While a due consideration of the local and general symptoms which attend cases of membranous pericolicitis is sufficient to establish a strong probability of the existence of that condition in a given case, and the findings of the bismuth X-ray picture may corroborate the opinion formed, nevertheless, an exploratory incision is requisite to fully establish the diagnosis, estimate the full extent and nature of the condition, determine its amenability to treatment, and point out the exact procedures needed to best overcome the conditions found.

It should not be forgotten that an unduly mobile cæcum with ptosis may lead to distention, atony, and inflammation of its walls, and thus conduce to fecal stasis and the secondary changes springing therefrom, without the antecedent presence of the membranous films and bands which have been considered in the preceding paragraphs. The symptoms of *cæcum mobile* with atony and stasis and distention with gaseous products differ only in degree from those of the more positive obstruction, and inasmuch as they are amenable to control by such non-operative measures as suitable abdominal supporting bandages, proper exercise and diet, the use of enemata and laxatives, and the administration of intestinal antiseptics, the cautious surgeon would naturally reserve the

resort to operative measures until after a reasonable period of trial of such hygienic and medicinal treatment. The persistence of the local symptoms despite treatment should, however, call for operative exploration.

In a large proportion of cases the appendix is involved in the infection process, if indeed it has not been its original nidus, and it is probable that a case will come to operation with the primary diagnosis of appendicitis. It occasionally happens that when the appendix is exposed the changes found in it do not seem commensurate with the symptoms previously existing. In every such case the incision should be made sufficiently free to permit of full exposure and careful examination of the terminal portion of the ileum and the cæcum and colon as far as the hepatic flexure. More than this, it is desirable in many cases that the gall-bladder and pylorus be also palpated and their condition ascertained. In many cases the appendix will already have been removed months or years previous, and the persistent continuance of the right iliac symptoms notwithstanding the removal of the appendix is the occasion of the call for relief.

The best place for such an exploratory incision is along the outer border of the right rectus muscle, or through its substance, opening its posterior sheath. A primary longitudinal incision in this location with its upper end at a point somewhat above the umbilicus and extending downward some three inches or more will give good access to the region involved. Such an incision can readily be prolonged in either direction as the subsequent needs of the exploration may indicate.

The primary indication of treatment after the abdomen has been opened is to cut all the confining bands and remedy any sharp angulation that may be demonstrable (Figs. 1, 5, 8, 9, 10, and 12). A thin pannus-like membranous veil spreading out over the anterior wall of the intestine as a whole need not be removed *in toto*, but any cord or band-like aggregation of its fibres should be cut, possibly repeatedly, until full relaxation is obtained.

All raw surfaces produced by the freeing incisions must be

FIG. 4.



Membranous pericolicitis with partial obstruction at hepatic flexure by band. Head of caecum and terminal portion of ileum bound down to brim of upper pelvic strait. The skiagraph shows the caecum and ascending colon to be distended by the bismuth mixture; the partial obstruction at the hepatic flexure is demonstrated. Note the caecum drawn down to and projecting over the brim of the pelvis; note the lowered position of the transverse colon, which crosses the abdomen in a nearly straight direction below the level of the umbilicus, and then makes a marked angle in the left iliac fossa as it turns upward to ascend to the splenocostal region.

1700

covered in by peritoneum secured by sutures, so as to prevent the renewed formation of crippling adhesions.

After-treatment should not be neglected following operative recovery. This should be along the same lines as those employed for relief before operation, and should now be followed by much more positive and lasting benefit.

ILLUSTRATIVE CASES.

CASE III.—An intelligent man, thirty-seven years of age, presented himself with the following history: As a youth and young man he had enjoyed good health and had displayed an activity and energy above the usual. About five years ago he began to suffer from pain and tenderness in the right iliac region. This was diagnosed as appendicitis, and for its relief he was operated upon in the usual manner by a surgeon in a neighboring State. He made a rapid and uncomplicated operative recovery—was out in two weeks—but since that time has never been well. He has suffered constant discomfort in the right iliac region, with frequent attacks of pain attended with a sense of distention and a perceptible temporary tumor in that region. He has been obstinately constipated, has manifested the usual effects of autointoxication, such as headaches, general malaise, exhaustion after slight physical effort, imperfect circulation as manifested by coldness and clamminess of the hands and feet, dizziness whenever he bends down, appetite good but frequent nausea, furred tongue, yellowness of the conjunctivæ, drowsiness, unrefreshing sleep.

Examination at the time of admission to the hospital confirmed the above conditions, except that palpation of the abdomen was negative save over the gall-bladder, where deep pressure elicited some tenderness. A bismuth X-ray skiagraph gave a distinct outline of the last portion of the ileum, of the cæcum, and the colon (see Fig. 4). There did not appear to be any kink in the ileum, but the base of the cæcum was depressed to the brim of the pelvis. The whole cæcum and ascending colon up to the hepatic flexure were greatly dilated, and the dilated portion was limited by a well-marked line of constriction which separated the hepatic flexure from the first portion of the transverse colon. The remaining portion of the colon, which had been

filled by a bismuth enema, was normal. A second exposure, made thirty minutes subsequent to the first, showed the cæcum less distended, some of the bismuth mixture filling it having now passed into the transverse colon.

As the patient had been under appropriate medical treatment for a long time, there was no hesitation in resorting without further delay to exploration. This was carried out by means of a five-inch incision through the upper and middle portion of the right rectus muscle. The head of the cæcum was found bound down to the brim of the pelvis by a fairly dense membranous sheet of inflammatory new formation (Fig. 5), which extended out upon the last three inches of the ileum. The appendix was absent, its point of insertion into the cæcum being marked by a smooth scar. The ascending colon, as far as the hepatic flexure, was covered by a thin translucent pannus-like film of similar character. At the hepatic flexure this was thickened into a well-marked band about one-half inch in width, which constricted the flexure. A free division of the ileocæcal pelvic sheet was made so as to free the head of the cæcum and the ileum to a normal degree (Fig. 6). The great vessels along the brim of the pelvis were exposed in this demonstration. The reflected portions of the peritoneum were replaced and sutured into position so as to cover in the raw surfaces exposed by this procedure (Fig. 7).

The film covering the anterior surface of the colon was carefully divided in the direction of the longitudinal axis of the bowel and allowed to retract, so as to expose the normal longitudinal band running along that portion of the intestine. The result of this division was manifestly to render more mobile the intestine. The band binding down the hepatic flexure was then divided and the hepatic flexure loosened. The peritoneum was drawn over the raw surfaces.

Careful examination of the gall-bladder and gall passages and adjoining viscera was then made, and no appreciable lesions were detected. They were not disturbed. The wound was then closed by the usual layer suture. A smooth operative recovery followed. The later effects of these measures have been relief of the constipation, the cessation of the local pains in the right iliac region upon the disappearance of the constipation, and a marked improvement in the neurasthenia.

FIG. 5.



A further extension of pericolic films. In addition to the adhesions binding together the appendix, caecum, and ileum, note the strong band extending from the ileum to the iliac fossa and the films restricting the mobility of the caecum and the ascending colon. Case III.

FIG. 6.



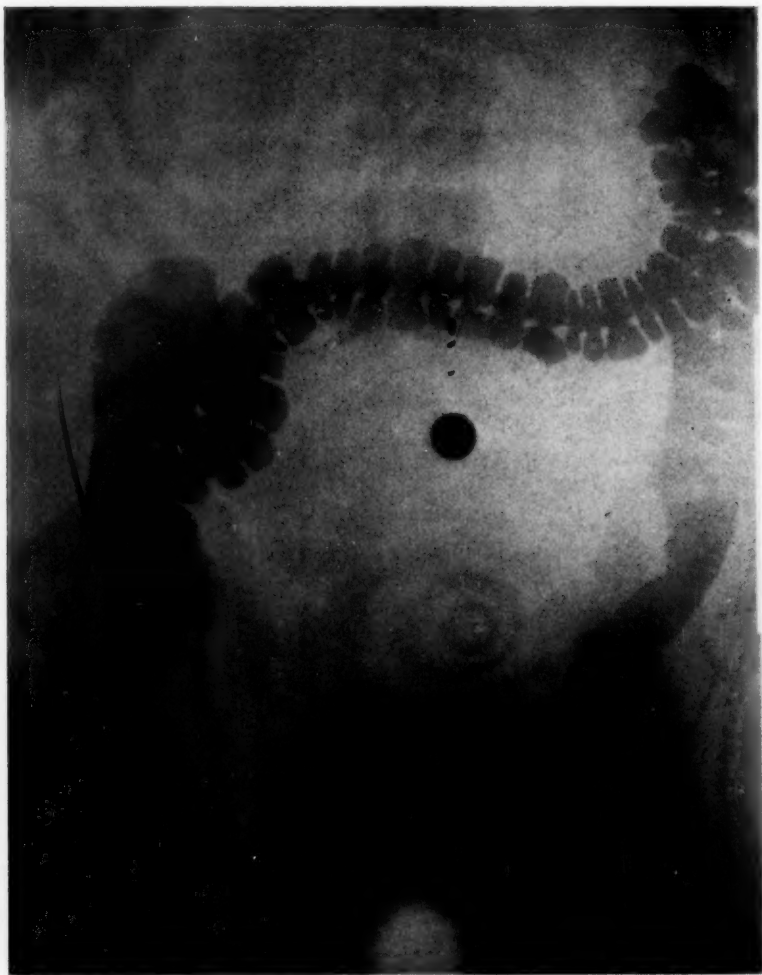
To show operative steps taken for the relief of the condition shown in Fig. 5. Membranous fold binding ileum, appendix and head of cæcum divided transversely and sutured longitudinally; appendix freed and ready to be removed; film and bands over cæcum and colon divided, dissected back, ready to be tucked and sutured beneath the freed cæcum.

FIG. 7.



Condition as presented at the conclusion of the operation for relief in Case III. The ileum and the head of the cæcum have been freed and are now being held up by the thumb and finger of the operator; the appendix has been removed; that portion of the floor of the iliac fossa from which these parts have been enucleated is again carpeted by peritoneum secured by proper lines of suture.

FIG. 8.



Acute angle at hepatic flexure. Ascending and first portion of transverse colon bound together after the fashion of the two barrels of a double-barrelled shot-gun by membranous veil containing multiple well-defined bands shown in the sketch forming Fig. 9. Note there is no ptosis of the cæcum or colon.

CASE IV.—This patient was a large, athletic, finely developed man, thirty-four years of age, who had always pursued an outdoor occupation. Seven years ago he was subjected to operation for what was diagnosed as acute appendicitis, from which operation he made an apparently uncomplicated recovery. At the end of a year, however, he began suffering from pain in the right iliac region of the same character and in the same location as that which had attended his primary attack, though less intense in degree. He was laid up by this for some days. Since that time up to the present he had had frequent similar attacks lasting from a few hours to a day. These he described as being attended with a sense of distention, and at times a visible tumor in the region of the cæcum could be determined. Relief was experienced after the sensation of the passing of gas. The bowels were habitually constipated, and at the time of these attacks relief followed a movement of the bowels. At the present time he has discomfort practically all the time over the region of the ascending colon and has the typical symptoms of autointoxication.

Upon examination there was tenderness upon pressure in the right iliac region. Gurgling sounds were produced by pressure on the cæcum and ascending colon, and percussion over the ascending colon was markedly tympanitic. A bismuth X-ray skiagraph (Fig. 8) showed the cæcum in normal position. The hepatic flexure lay somewhat lower than normal, and the first portion of the transverse colon was sharply angulated, so that some inches of the first portion descended in front of the ascending colon. Then it ascended in a sharp angle to the splenic flexure, which was normally placed. The descending colon and sigmoid were normal.

After the usual period of preparation the abdomen was opened by a longitudinal incision through the right rectus muscle. The ascending colon and hepatic flexure when exposed were found to be covered over their whole extent by a thin translucent membranous film, with well-marked, vascular congestion of the whole area. The thickened right border of the omentum at its tip was densely adherent to the wall of the flank near the iliac crest, forming a covering to the underlying colon. This omental mass was divided from its insertion and reflected. After this piece had been reflected there was exposed the first portion

of the transverse colon, which was also bound to the same point of the lateral abdominal wall by a very dense, strong, thick fibrous band about one-quarter of an inch in width.

The result had been to sharply angulate the colon at the hepatic flexure and to bring parallel to each other the ascending colon and the first part of the transverse colon, lying side by side like the two barrels of a double-barrelled shot-gun. The two parallel portions of the colon were bound together by thinner, more film-like adhesions (Fig. 9). These were divided and the thick band excised. The stump of this adhesion band on the intestinal side was buried by two points of Lembert suture. The raw area left on the lateral wall of the abdomen was likewise covered in by peritoneum.

Traction upon the cæcum and terminal portion of the ileum showed these structures also to be drawn down and fixed by an extensive film of adhesion. By making traction upon the cæcum it was possible to demonstrate this condition most clearly and note the line of demarcation between the peritoneum of the pelvic wall and the peritoneum of the intestine. This adhesive film was freely divided and the cæcum liberated. The raw surface left was covered in by drawing over it suitable folds of peritoneum. The operation wound was then closed in the usual manner. An uncomplicated operative recovery has followed. Since the operation he has been free from the right iliac discomfort and attacks of pain. His general health has been good. The bowels are somewhat sluggish and he takes a mild aperient twice a week as a matter of precaution or possibly habit.

CASE V.—This was in the person of a lady thirty-two years of age, who for four years had been suffering from pain in the right iliac fossa. A year after its inception she was subjected to an appendectomy, from which she made a prompt operative recovery, but, nevertheless, continued to suffer from pain and tenderness referred to the right iliac region, with a marked degree of general neurasthenia. With this there was considerable bladder irritability, and there was an enlarged and sensitive right ovary. Urinary and cystoscopic examination negatived any kidney or renal complication. The abdomen was opened and the microcystic condition of the right ovary was remedied by a cuneiform excision. Examination of the right iliac region showed the cæcum bound by a well-marked membraniform film, which extended upward for some inches along the terminal por-

FIG. 9.



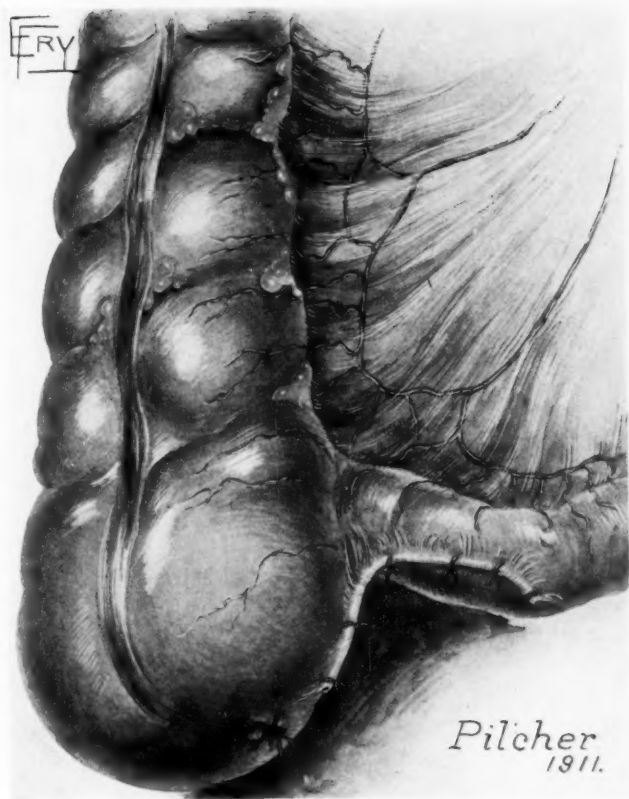
Cæcum and ascending colon covered by membranous film with multiple well-defined bands which extend upon the first portion of the transverse colon and bind it to the ascending colon like the two barrels of a double-barrelled shot-gun, with acute angulation at the hepatic flexure. Sketch made from the case, the skiagraph of which is seen in Fig. 8.

FIG. 10.



Sketch made to show the condition present in Case V. Terminal portion of the ileum, the appendix and the caecum bound together by strong membraniform film.

FIG. 11.



Condition left after removal of appendix and restraining bands. Case V.

FIG. 12.



Double barrel shot-gun association of two portions of the colon with acute angulation at the hepatic flexure. Sketch made from Case VI.

tion of the ileum, and bound that portion of the ileum and the head of the cæcum together (see Fig. 10). Along the central portion of the ascending colon there was a marked thickening of the film, which formed distinctly recognizable bands which bound the colon to the lateral peritoneal wall. As the hepatic flexure was approached, this film became much thinner, but still recognizable, containing abundant injected vessels, indicating a condition of continuous irritation. The membrane binding the ileum and cæcum together was divided transversely, and the two portions sutured longitudinally, so as to free the two portions of intestine from each other (see Fig. 11). The pericolic films and bands higher up were likewise divided, and the film dissected back so as to free the colon. The membranous flap produced by this procedure was placed behind the colon and cæcum, where it was attached by suitable points of suture. The parts having been readjusted, the wound was closed. Patient made an uncomplicated operative recovery, with immediate relief from the symptoms of which she had previously complained. The immediate improvement in her general neurasthenic manifestations was very marked.

CASE VI.—This patient was a lady fifty-one years of age, who had long been a delicate, ailing, neurasthenic woman. She suffered from retroversion of the uterus, and finally developed a large myoma, which was removed in 1904 by Dr. Paul M. Pilcher. She has for years suffered from pain and tenderness diffused through the lower abdomen, more particularly and constantly felt on the right side. She has had many transient attacks of sharp pain referred to the right hypochondriac region. More recently she has complained also of gastric discomfort. Her bowels have always been regular. The presence of renal and bladder complications was eliminated by proper examination. Upon opening the abdomen, the duodenum, gall bladder, and stomach were found to be normal. The colon was sharply angulated at the hepatic flexure, and the first part of the transverse colon descending sharply as far as to the ileocæcal junction was bound to the ascending colon, cæcum, and ileum by a well-marked membranous film, which presented at points along its course well-marked bands of thickening, these being lost beyond in the substance of the mesocolon (see Fig. 12). This membrane was divided longitudinally throughout its whole extent from the cæcum to the hepatic flexure, and the two port-

tions of the colon freed from each other. The appendix, thickened and partially obliterated, was confined and sharply angulated by a thick, short meso-appendix, which extended to its tip and bound it to the outer and posterior portion of the cæcum. This meso-appendix extended also upward upon the adjacent portion of the ileum, and produced a sharp angle in it as well. The appendix and meso-appendix were removed, and the peritoneal planes brought together by sutures, so as to cover in all raw surfaces and free the cæcum and terminal portion of the ileum from any restraining attachment. The patient made an uncomplicated operative recovery, and was at once freed from the special symptoms from which she had previously complained.

CONCLUSIONS.

As a result of these personal observations, together with the experience reported by other surgeons, it has seemed to the writer that these right-sided pericolic adhesions and membraniform crippling veils and bands form a fairly distinct pathological entity deserving of recognition as a well-defined surgical condition. In all cases they are a source of ill health and suffering. In some cases they are a positive menace to life. In most instances they can be relieved by procedures that are attended with a minimum of operative risk.

REFERENCES.

- Jackson, Jabez: Membranous Pericolitis, Transactions of the Western Surgical and Gynecological Association, 1908.
- Lane, Arbuthnot: Chronic Constipation, Surgery, Gynecology and Obstetrics, 1908, vol. vi, p. 116.
- Lane, Arbuthnot: The Kink in the Ileum in Chronic Intestinal Stasis, 1910.
- Mayo, Charles H.: Intestinal Obstruction Due to Kinks and Adhesions of the Terminal Ileum, Collected Papers, vol. ii, 1911, p. 221.
- Gerster, Arpad G.: On Chronic Colitis and Pericolitis, ANNALS OF SURGERY, September, 1911.
- Lerch, Otto: Movable Cæcum and Typhlotomy, Medical Record, Oct. 14, 1911, p. 766.
- Satterlee and Lewald: Some Apparently Obscure Conditions of the Gastro-intestinal Tract and the Practical Application of the Röntgen Ray in Their Diagnosis, Journal of American Medical Association, Oct. 14, 1911, p. 1255.
- Francke: Coliinfektion der Harnwege. Mitteilungen aus den Grenzgebieten der Med. und Chir., xxii, No. 4, 511-674.

THE SURGICAL TREATMENT OF COLITIS.*

BY CHARLES LANGDON GIBSON, M.D.,

OF NEW YORK,

Surgeon to St. Luke's Hospital.

My interest in the surgical treatment of colitis dates back to 1900, when I devised a line of treatment intended to replace the only means recognized then as efficient, namely, artificial anus. This method of mine is the one most generally used to-day; but its origin and usefulness have been considerably obscured by the introduction of a modification in the technic of my original operation by Weir, substituting for my valvular cæcostomy appendicostomy. I hope to be pardoned if I make this paper the subject of a review of the development of the more modern treatment.

As regards the value of the artificial anus, I had been very sceptical, in the brief years it flourished, whether the cure was not worse than the disease. Moreover, the evidence advanced of its curative value was oftentimes unconvincing, and it was natural that the relief obtained should only be partial unless a complete artificial anus was made, absolutely preventing the fecal current from reaching the colon.

If a *complete* artificial anus were made, its eventual repair required a severe operation with a high mortality.

I set out deliberately to devise a form of operative treatment that should be the antithesis of the artificial anus, allowing of no escape of fecal contents.

I felt that if the principles of ordinary surgical drainage and cleanliness could be applied to the large intestine, we would have gained considerably in facilitating the healing of the ulcerated surfaces. That result I thought could be brought about by devising a means of frequently flushing the large

* Read before the International Society of Surgery at Brussels, September, 1911.

intestine, greatly diluting its irritating contents, and removing them from prolonged contact with the ulcerations. So if we could give the patient an opening in the bowel for access to its contents and yet prevent their egress, the problem would be solved.

The Kader form of gastrostomy had then come to be considerably employed, and all I had to do was to use the same technic in the cæcum, which I did. At the outset I believed that by making a suitable incision (intermuscular) we should have a small and easily controlled wound, confinement to bed for its healing ten days or less, the patient could then receive ambulant treatment or administer it himself by introducing the tube several times a day and flushing out the bowels with various appropriate solutions. During the intervals neither tube nor dressing need be worn, and the closure of the wound would be automatic, as the discontinuance of the passage of the tube for a few days would allow of the valve action to become permanent.

All these theoretical requirements were found in general to be feasible in practice; but owing to the introduction of appendicostomy two years later, the origin of the method was lost sight of. I was a long time in getting an opportunity to perform this operation myself; but two of my kind friends, to whom I described this procedure, were good enough to make a trial of it at my suggestion.

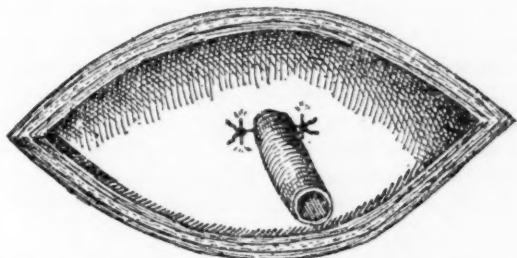
Dr. P. R. Bolton performed it in 1900, reporting the case in the *Medical Record* for March 16, 1901, and in November, 1901, Dr. F. H. Markoe also performed it at my suggestion. My first case was performed later in 1901. The method was described in a paper¹ read by me March 5, 1902, in Boston, but publication was delayed till September.

Dr. Weir, in April, 1902, did my operation at my suggestion. The same day he had a second case, and having had some difficulty with my technic (tube was pulled out after being put in place), decided to use the lumen of the appendix

¹ The Creation of an Artificial Valvular Fistula for the Treatment of Chronic Colitis, Boston Medical and Surgical Journal, Sept. 25, 1902.

as the channel. He lost no time in getting into print, so that, when my article appeared, appendicostomy had already been claimed as the proper treatment for colitis, and is generally so used. I think, whatever its merits from the technical

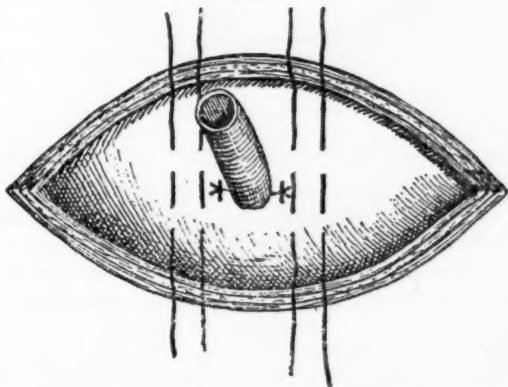
FIG. 1.



Tube introduced and held in place by the suture placed on either side.

standpoint, that the modern treatment owes its origin distinctly to me. That is, if I had not shown Dr. Weir how to do a valvular colostomy, he never would have thought of treating colitis except by the formation of an artificial anus.

FIG. 2.



The first row of inversion sutures in place but not tied.

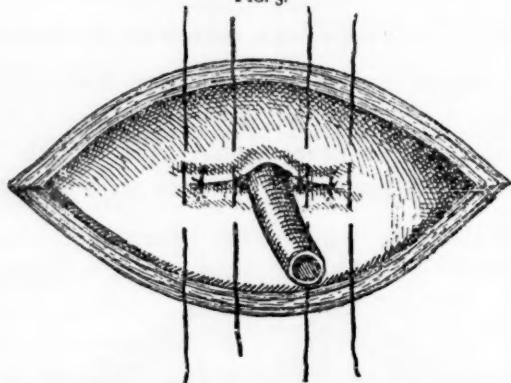
I cheerfully recognize the merits of appendicostomy. It is a little simpler for a person without much surgical skill to perform, and therefore safer. The appendix may, however, not be of a suitable size or position (retrocæcal) to lend itself properly to the procedure, and the patient has to wear constantly a dressing, which is not the case with my technic.

So there still remains some sphere of usefulness to the original operation and I repeat its original description, as given in the *Boston Medical and Surgical Journal*, September 25, 1902.

The technic is as follows:

A small incision—preferably the McBurney intermuscular—is made over the caput coli. If desirable, the anæsthetic can be discontinued so soon as the peritoneum is opened. Nitrous oxide gas anæsthesia might be used. With an intelligent and self-controlled patient local anæsthesia might suffice. Should there be any difficulty in bringing the colon to the surface, I see no positive disadvantage in utilizing the lower ileum. Two Lembert sutures, half an inch apart, are inserted, and the cæcum opened between them. A soft catheter, about 30° F., is introduced so that it

FIG. 3.



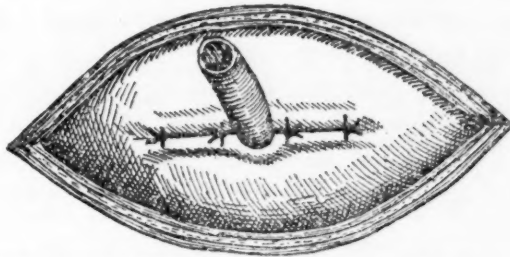
The first row of inversion sutures has been tied, the second row in place but not tied.

projects well into the bowel, and the original sutures tightly tied. The wall of the gut is further infolded around the tube in two superimposed layers. The ends of the superficial layer are used to suture and hold the cæcum to the musculo-aponeurotic structures. The tube may also be secured in place by passing a fine catgut stitch through its wall. The abdominal wound is closed at the angles, or packed. It will be safer not to begin irrigation before three or four days. The tube may be withdrawn in a week or ten days, being introduced only when necessary for the irrigation, and withdrawn so soon as it has served its purpose. If our ideal has been attained, there will be no leakage, even when the colon is visibly distended. Treatment should be persisted in till a cure is obtained. Closure of the fistula occurs spontaneously with the discontinuance of the daily passage of the catheter.

It seems to me unwise, if not impossible, to attempt at present to formulate any indications for the employment of this measure. From what has been related, it is fair to say

that certain forms of colitis can be cured by it. It may be objected that such cases and the ones here described are of the milder variety that would yield to the orthodox treatment. Personally, it seems that the results have been more direct, progressive, and prompt than are attained by the non-operative measures.

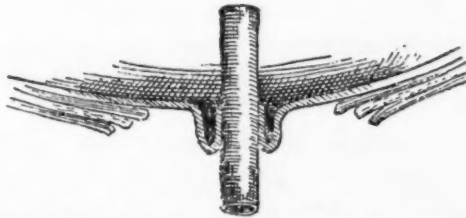
FIG. 4.



Operation completed. The tube is infolded in a furrow of the cæcum.

On the other hand, I do not cherish any illusion regarding certain forms of ulceration, such as the tubercular, that may be properly considered as incurable, especially when accompanied with similar or more extensive changes in the small intestine. Actual experience only can determine whether by frequent cleansing of these ulcerating

FIG. 5.



Showing the formation of the valve as seen from within the lumen of the bowel.

surfaces and by neutralization of the products of decomposition we can somewhat ameliorate the symptoms, and if to an extent that warrants actual interference.

With regard to the therapeutic agents that may prove of value when so locally applied, I can only indicate those ordinarily employed. For the present I shall rely principally on the mechanical cleansing by flushing the bowel with an ap-

propriate bland solution, such as the normal saline. It may either be used as a continued irrigation, escaping through a rectal tube, or the colon may be filled to moderate distention, say three quarts, and subsequently evacuated. The frequency should be established by the tolerance of the bowel and the urgency of the symptoms. At the beginning, if well borne, I should prefer to repeat the irrigation at regular intervals of eight or twelve hours, possibly oftener. Agents destined to exert a direct influence on the ulcerating surfaces will naturally act better after the preliminary cleansing. They should be introduced separately from the saline, or after it has been evacuated. The bowel should be flushed with plain water prior to the use of substances such as AgNO_3 , which combine with the saline.

The required therapeutic agents will also vary somewhat with the nature of the colitis. Gradually increasing strengths of quinine and methylene blue have been recommended for the amœbic form. Nitrate of silver in strengths increased from 1-20,000 will, I think, prove the best single remedial and stimulating agent. The whole gamut of the milder non-poisonous antiseptics, especially of the naphthol group, may be tried, as well as the ordinary astringents. Small doses of iodoform in emulsion might be tentatively tried in the tubercular form. Glutol, a non-irritating derivative of formalin, which acts so admirably in ordinary suppurations, might also be employed. The patient should be on an appropriate, chiefly proteid, diet.

My own experience is very small, but gratifying. Six cases. One tubercular case (unsuitable) was not improved. Four cases were cured. In one subsequently operated upon by another surgeon for another condition, marked healing of many of the ulcerated areas was found. One patient almost moribund was operated upon with local anæsthesia very satisfactorily and was completely restored to health.

None of these cases was of the amœbic variety, which I believe is hard to cure by this or any other means, and are liable to undergo relapse sometimes after long intervals of freedom from symptoms.

SURGICAL TREATMENT OF ACUTE PANCREATITIS.*

BY PROF. DR. W. KÖRTE,

OF BERLIN, GERMANY,

Surgical Director of the Krankenhaus am Urban.

THE surgical treatment of acute inflammations of the pancreas and their sequelæ, pus formation and necrosis, has in the last two decades made marked advances. In 1894 when I made my first communication on this subject before the German Surgical Society it occasioned no discussion. Up to that time acute inflammation of the pancreas had been recognized as a very infrequent affection. However, since then it has become more and more recognized and more frequently diagnosed. This is possibly owing to the fact that the surgical treatment of acute peritonitis has become more and more frequent, and surgeons with increasing experience have become more and more familiar with the handling of peritonitis, and have discovered therefore more frequently the beginning stages of acute pancreatitis, which evidences itself in a sero-sanguineous exudate, and especially in small areas of fat necrosis.

The light gold spots of necrosis in the abdominal fat are very easy to diagnose from other necrotic processes, and we know certainly that it is occasioned by the outpouring of the secretion from the pancreas, and from this observation the surgeon on opening the abdomen may immediately recognize that the pancreas is the original site of the disease.

My first experiences were with cases which were, however, in the stage of necrosis and peri-pancreatic pus formation. The observation which I made at that time was that the operation should not be attempted in the acute stage because of the very evident inclination to collapse, and that it

* Read before the International Society of Surgery, September, 1911.

should be undertaken only in the later stages of necrosis and pus formation. I appreciate now that I was entirely wrong, due to a much greater personal experience and also from the observations of many other surgeons—Hahn, Pels-Leusden, Köhler, Bunger, Garré, and others.

I wish in the following communication to state my experiences in these cases and to point out that the early operation, here, as in other cases of inflammation of the abdominal organs, is most important to the subsequent recovery of the patient. In 1895 I operated on a case with a diagnosis of acute inflammation of the gall bladder (combined possibly with intestinal obstruction), and found evidences of inflammatory exudate accompanied by spots of fat necrosis. I examined the abdomen for the anticipated occlusion of the intestine, without however being able to find any. I removed a gall-stone from a gall-bladder in which there did not seem to be any evidence of inflammation, sponged the exudate out of the abdomen and drained with iodoform strips. The patient recovered.

At that time the etiologic correlation between pancreatitis and fat necrosis was not so well appreciated as at present, so that I did not correctly interpret the findings in this case.

In 1900 Hahn expounded the great importance of early operation based on the recovery of cases of severe inflammation through the liberation of exudate and drainage with iodoform gauze. Halsted, however, previous to this had a similar case with a successful recovery. He operated in 1899 or 1900 on a patient with the symptoms of inflammatory obstruction, and found on opening the abdomen a serosanguinous exudate and fat necrosis, but no intestinal occlusion. He did find, however, a thick, hardened mass in the region of the pancreas. The abdomen was closed without drainage and the patient made an uncomplicated recovery. On March 3, 1902, in a communication from Dr. Halsted he stated to me that the patient since her recovery from her operation had remained well. In April, 1911, on meeting Dr. Halsted personally, he stated to me that although the patient was

still alive, she was very weak and incapacitated. It is a question with me, therefore, in considering this case, whether the recovery might not have occurred without operation and not as a result of operation, although, as the result of our later experience, it seems quite possible that these cases can completely recover merely through the sponging out of the exudate from the abdomen, particularly in cases where there has been no very severe inflammation of the pancreas.

Bunger, in 1901, because of a case of acute hemorrhagic pancreatitis on which he operated and which recovered, also emphasized the necessity for an immediate attack on the organ, and for the first time brought up the question of the importance of direct drainage of the inflamed organ. The experience of Kohler and Pels-Leusden pointed in the same direction. Since this time we have learned to appreciate the absolute necessity of making early incision in all cases of inflammatory peritoneal conditions, and in consequence many operations have been performed in which acute pancreatitis has been discovered as the causative factor, while before this communications regarding such cases were considered rarities, in which but little consideration was given to their outcome.

Before we go into the particulars of the surgical treatment it is important to understand and to define the varieties of acute inflammations of the pancreas. The first attempt at this was made in 1899 by Fitz, in a monograph on acute pancreatitis, in which he described three forms—the purulent, the hemorrhagic, and the gangrenous pancreatitis. His excellent exposition of the subject is even to-day nearly correct, and we have dealt since then more with transition stages and combinations of these three primary forms mentioned by him. Thus can the purulent inflammation run over into necrosis with discharge of portions of the gland. The hemorrhagic inflammation progresses without doubt in many cases into gangrene of greater portions of the gland, and the discharge of pancreatic tissue as a result progresses to peripancreatic pus formations. Thus when one realizes that while it is possible to establish the transition stages in pathological and

anatomical examinations, one must also appreciate the fact that it is not possible to sharply differentiate in the patient any of these various stages during life. It is impossible to diagnose inflammation of the pancreas in a great many cases with much positiveness, nor to say further whether the purulent, hemorrhagic or gangrenous form is present, as by early operation we can find nothing but a hemorrhagic inflammation, while in the same case in which operation has been undertaken in a later stage or even from post-mortem examination, the picture of a pancreatic necrosis with very evident retroperitoneal pus formation is to be found. So it seems to me from the clinical point of view most important to speak only of acute pancreatitis.

The acute inflammation declares itself by bloody and serous infiltration of the tissue, evidenced by the swollen organ. The lighter grades of inflammation of the pancreas can unquestionably entirely disappear or go on to the chronic form. Very frequently we find in the cases of patients suffering with acute pancreatitis that earlier they had suffered from less severe disturbances of the same nature, from which they recovered. Unquestionably in this class belong those cases which have recovered after merely evacuating the peritoneal exudate without complete exposition or incision of the pancreas.

In the severer cases of inflammation we find first the profuse hemorrhagic infiltration of the tissues. The corrosive properties of the secretions of the gland tend to eat away the vessels from which severe hemorrhages have occurred into the tissue. This acute hemorrhagic inflammation which has been frequently found in many cases at operation is certainly a definite entity. It frequently causes the death of greater or smaller masses of the gland tissue, and has also in several instances gone directly over into a total necrosis of the pancreas.

Next in order to this hemorrhagic inflammation which results from hemorrhage following an inflammatory process, we have to consider the acute outpouring of blood in the pan-

creas, which is not the result of inflammation, but of disease of the blood vessels or from trauma of them. These primary hemorrhages go on, in many cases to sudden death. In others, however, the disturbance and infiltration of the gland tissue cause necrosis secondarily. Rarely does the *dead* tissue remain aseptic. There are, however, such occasional cases recorded, in which there has formed in the omental bursa a pseudo cyst in which the contents have been found to consist of large pieces of dead gland. They are, however, exceptions. As a rule these cases pass over into necrosis of the pancreas with pus formation. It is probable, however, that the inflammation occurred primarily after the disturbance of the gland by the hemorrhage and that the bacteria secondarily invaded the sequestered tissue. It is also possible for acute pancreatitis and also the primary acute hemorrhage in the pancreas, which is not inflammatory, to pass over into necrosis of the pancreas and pus formation, and it is difficult for one to say when they have seen a case first in this stage whether the necrosis is the result of the inflammatory or non-inflammatory hemorrhage. The pus drains over into the omental bursa or develops a retro-peritoneal focus and presents in the flank, more frequently on the left side rather than the right; more seldom the pus ruptures through the gastrohepatic ligament and forms a left sided subphrenic abscess. That form of inflammation or necrotic disturbance of the gland tissue which invades the intralobular tissues, releases pancreatic enzymes, which is evidenced by the small spots of fat necrosis, by which this form of inflammation can rarely be overlooked. Since the experiments of Doberauer, Gulecke and von Bergmann, we must recognize that in the cases of pancreatitis in which there is a free outpouring of the ferment, we can ascribe to it the cause of the severity of the sickness or even the death of the patient.

Next to consider is the purulent form of pancreatitis which finds its etiological factor in the infection carried from the intestines or from the bile passages through the papilla of Vater, or the inflammation can be caused by infection con-

veyed through the lymphatics (Bartel). Again, pancreatic stones are frequently the cause of pancreatic abscesses. Many smaller abscesses may be so caused or through their combination a large abscess cavity may be formed in the gland. Thus through the decaying of pieces of tissue, hemorrhages can occur from the erosion of the vessels. One draws the conclusion from the foregoing that the various forms of inflammation are not to be sharply defined but rather run over into one another and are combined with each other. Therefore it seems best to me to only consider the condition of acute pancreatitis, in which term I include all three kinds of inflammation and their sequelæ, for the basis of clinical consideration and especially for the indications for treatment.

If we take into consideration the casualty statistics of Villar (French Surgical Congress, 1905) we can appreciate without looking further how difficult it is to fit into the scheme the scattered cases which occur in the literature (acute pancreatitis, hemorrhagic pancreatitis, suppurative pancreatitis and gangrenous pancreatitis). The casualty statistics since that time from this cause have been augmented, but consist chiefly of the reports of individuals. Only a few surgeons have had a large number of cases of pancreatitis or in their articles on the subject have gathered together material other than their own. From the many scattered cases of various authors it is however not correct to draw definite conclusions and to deduce from them the ultimate results. As is natural the favorable results of a large number of operations have been published rather than the unfavorable. Villar, who also mentions this difficulty, found 67 recoveries and 63 deaths. After considering Villar's statistics, I found since 1905 the scattered records of 118 cases of operation for acute pancreatitis—73 recoveries and 45 deaths, a mortality of 38 per cent. When I cut from the list the cases which had been mentioned twice I found that I had 103 cases with 41 recoveries and 62 deaths, or 60 per cent. mortality.

SURGICAL TREATMENT OF ACUTE PANCREATITIS. 29

		Recovered	Died
Eloesser-Czerny	.....3 cases pancreatic abscess	.....3	0
Eloesser-Czerny	.....1 case pancreatic necrosis	.....0	1
Eloesser-Czerny	.....3 cases hemorrhagic inflammation	.....0	3
Garré	.....7 cases	.....3	4
Hahn	.....4 cases	.....2	2
Doberauer	.....5 cases acute inflammation	.....1	4
M. Robson	.....4 cases hemorrhagic inflammation	.....2	2
M. Robson	.....6 cases suppurative inflammation	.....5	1
Notzel	.....8 cases hemorrhagic inflammation, necrosis, abscess	.....3	5
Coenen-Kuttner	.....5 cases	.....4	1
Tietze	.....6 cases	.....2	4
Seidel	.....10 cases	.....3	7
Deaver	.....6 cases	.....3	3
Mayo	.....3 acute cases	.....2	1
Morian	.....5 acute cases	.....0	5
Musser	.....5 acute cases	.....3	2
Kehl (Liebold)	.....5 cases	.....1	4
Neumann	.....9 cases acute pancreatitis	.....3	6
Neumann	.....8 cases necrosis	.....1	7
Total	.....103	.....41	62

It is at once evident that these lists of statistics are much less favorable and come much nearer the truth than did the first. (N. B. Reference may also be made to a number of further statistics which have been gathered out of the literature, viz.):

		Died	Per cent.
Quénu:	21 operations for acute pancreatitis	13	61.9
M. Robson:	59 operations for acute pancreatitis	36	61.0
Ebner:	36 operations for acute pancreatitis	19	52.7
Dreesman:	118 operations for acute pancreatitis	61	51.7
Nobe:	43 operations for acute pancreatitis	21	48.8

The percentages of mortality based upon these scattered cases are of only approximate value. In order to draw a therapeutic conclusion it seems to me better to consider my personal experience rather than to collate a greater number of observations by other authors. My material consists of 44 cases of acute pancreatitis and their sequelæ. Of these, 34 occurred in my division in the Krankenhaus am Urban and also in my private practice, while 10 cases came from the

second surgical division of the Hospital which were seen and reported by Professor Dr. Brentano, to whom I wish to express my thanks for the permission to use his cases. In these cases, either through operation or through post mortem examination, often both, the diagnosis has been fully established. Besides these 44 cases there were 8 others in whom the clinical symptoms notwithstanding their favorable course warranted the diagnosis of acute pancreatitis. Of these 7 cases recovered and one died, without, however, a post mortem being obtained. As we have thus far no absolute pathognomonic signs in this sickness (the Cammidge reaction has been entirely negative in the acute cases) it seems best that the diagnosis of acute pancreatitis in these 8 cases should be considered merely as probable, since there was no autopsy either in life or after death. I have therefore omitted these 8 cases from this present series, in order to give the material considered the value of having been absolutely demonstrated.

Among the 44 cases, 38 were subjected to operation. In six cases no attack was possible. These have been considered merely from post mortem examination. Of the 38 cases operated upon, the diseased pancreas was directly attacked in 34 of the cases, while in 4 patients merely the concomitant disease of the gall passages received operative treatment. The experience of these four patients, all of whom died, indicates that in such attempts one should consider also the direct attack on the pancreas itself. Possibly one or another of the four cases might have been saved if at the same time the gall bladder was operated upon we had considered operative interference on the pancreas itself. Of the 34 operated patients in which either as the result of a correct diagnosis arrived at during the operation or as the result of prior judgment the diseased organ was immediately approached—18 recovered and 16 died. Of the entire 44 cases, 30 were males and 14 females.

The youngest patient was 16 years (Case 33—operated in acute stage and recovered). The greater number, however,

had reached the fourth or fifth decade of life. The oldest patient was 70 years (Case 29—operated in acute stage, died).

The previous history of the patients before the acute illness in which they were brought to us for treatment in the greater number of cases stated that they had suffered a greater or less degree of similar distress, for the main part, however, of a much milder degree which had been supposed to have been caused by various conditions. Many stated that for a long time they had suffered from stomach distress with occasional acute exacerbations, usually referred to as cramps in the stomach. In three cases (Cases 4, 10, 25) at post mortem, duodenal ulcer was demonstrated, in which it is possible that the earlier complaints of epigastric distress found their origin. Very frequently the trouble was diagnosed as gall stone colic, and indeed, cholelithiasis has, as we shall presently see, frequently been found as a concomitant of pancreatitis, and it is to this condition that we must ascribe the etiologic factor in many of the cases. In them there were histories of periodical attacks of colicky pain in the epigastrium, and the operation or post-mortem examination showed gall-stone or inflammation of the gall-passages to be present (as in Cases 24, 26, 28). In addition, in Case 4, the colicky pain continued even after the gall-stone had been removed and while the bile was draining from the wound. The post-mortem examination showed that there was an abscess in the head of the pancreas. Thus it must be appreciated that attacks of pain, which in their character and also as to their situation fully correspond to the typical gall-stone colic, can also be caused by disease in the pancreas. Indeed, acute inflammation of the head of the gland causes the common duct to be congested and consequently dilated from the distal obstruction, which in turn causes jaundice, all of which tends to confirm one in the diagnosis of gall-stones. Thus it must be remembered that the onset of jaundice is not a pathognomonic sign in all cases of gall-stones.

Localized tenderness does not suffice to differentiate ex-

actly the affection from those of the gall passages, the duodenum or the pyloric region. The pain was for the most part in the middle of the epigastrium, and it must be remembered that it is here that the large sympathetic nerve ganglia are to be found, which transmit the sensitiveness from all of the points in this region. Therefore the attacks of pain in the epigastrium which occur in so many of the patients at the outset can be confused with other conditions in the neighborhood which give rise to similar phenomena, such as gall-stones, inflammation of the gall ducts, duodenal ulcer and ulcer of the stomach. However, in a certain number of cases one must realize that the sudden onset of inflammation of the pancreas is accompanied by a severe epigastric pain. It is seldom that there are no prodromata or at most very little symptomatology antecedent to the onset of acute pancreatitis (14 cases of the 44). In one case the conditions developed on the fifth day post partum (Case 15). Severe indigestion was twice given as the cause,—in six cases, the abuse of alcohol. It is not very evident that acute or chronic catarrh of the stomach forms conditions favorable to an inflammation of the pancreas. If this were an essential etiologic factor it would develop more frequently in the histories, which has not been the case. The acute illness as a rule becomes very marked, so that the patients can with certainty mention a particular day on which they were taken with the severe epigastric pain, belching and vomiting, so intense as to cause a marked liability to collapse. In other cases the acute onset was not so evident, and it was impossible to say exactly from what date the process began. The suffering is without question confined above the navel, and in this region there is a marked tenderness on pressure.

In consequence of the disturbances, and particularly that of inflammation of the peritoneum, the intestinal canal becomes affected, and therefore many of the cases have been diagnosed as intestinal obstruction. Indeed, the patients are usually referred with the diagnosis of peritonitis, perityphlitis, inflammation of the gall bladder or intestinal obstruction.

The correct diagnosis is not easily made in the acute stage. The one symptom which gives the most probable insight to the condition is that of tenderness across the middle of the epigastrium and the resistance over the pancreas, which I had the opportunity of pointing out in my first article in 1894. A tumefaction is occasionally to be felt after enemata have in some degree emptied the intestines. On the other hand, it may not be appreciated until the patient is anesthetized, at which time the strong contractions of the recti become relaxed. This, however, is not absolutely indicative that pancreatitis is present as in cases of an acute inflammatory process of the greater curvature of the stomach (ulcer or cancer) which may be on the point of perforation or of the mesocolon or in the mesentery there may occur similar phenomena to which may be added peritonitis in the upper abdomen which also presents a transverse tumor in the epigastrium. Any of these conditions may confuse the diagnostician.

However, these conditions occur but seldom, and their treatment is also surgical. When one meets with an acute inflammation of the upper abdomen in conjunction with a tender resistance in the epigastrium one may venture a tentative diagnosis of acute pancreatitis, and thereby settle the indications for an immediate attack. The Cammidge reaction has not been present in our cases of acute pancreatitis in the eight cases in which it was performed. In seven of these it was negative. It was done by the chemist of the hospital, Dr. Roma, after the method suggested by Cammidge. It is unfortunate that this reaction could not be obtained in the cases with which we are dealing, and thereby to some degree help us in the difficulty of diagnosing acute processes in the pancreas.

Another sign which occasionally appears during the course of an abscess of the pancreas is the appearance of sugar in the urine, which has however been but seldom present in those cases considered by us. The examination of the urine for sugar and albumin was naturally done in each case. In one case the sugar content was 6.95 per cent. (Case 8, recovery after

operation). Twice sugar was found in the proportion of 2 and 2.5 per cent. (Cases 40 and 41, both died). Three times smaller amounts were found varying from 0.5 to 1 per cent. (Case 18 recovered; Case 20 recovered; Case 30 died). In the other two cases there were only slight traces of sugar obtainable. The recovery of sugar in the urine is, however, only of small value in the diagnosis of acute pancreatitis. Of particular interest is the occurrence of sugar in the urine in Case 2 (the first patient who was operated on by free lumbar incision and who recovered after the evacuation of a very large amount of sequestered pancreas). The urine was, during the patient's residence in the hospital, frequently examined, and was free from sugar. One year and eight months after operation, however, on examination in the hospital, in February, 1895, 6 per cent. of sugar was found. By regulating the diet it cleared up quickly. The patient was very stout. On April 1, 1901, she passed into a condition of coma and died on April 3, 1901. The post-mortem report of Professor Benda showed a chronic thickening of the head of the pancreas, and while the body and tail of the gland were covered with scarred tissue, he concluded that the necrosis of the pancreas was not caused through the diabetes as the sugar appeared for the first time so long after the operation, but was rather inclined to the opinion that the disturbance in the pancreas had caused the diabetes to ensue. However, this is rather difficult to apply in the light of what the post-mortem examination showed, as there was still what seemed to be a large portion of the gland in a perfectly normal condition and actively secreting. One must also consider that the late occurrence of sugar in the urine might be consequent to some other condition than that of the pancreas.

The diagnosis before operation can only be made with probability owing to our lack up until the present time of any pathognomonic signs. Since we have observed a number of cases which presented the typical symptoms of epigastric peritonitis with subsequent inflammatory swelling posteriorly, and particularly in the left lumbar region, we have considered

this possibly the most certain sign which offers itself to the diagnosis of acute pancreatitis.

It was present in 18 cases which were diagnosed before operation, from which one-half recovered. In 13 others, the diagnosis was made through the observation of spots of fat necrosis at the time of operation (7 recovered; 6 died). In three others which were operated without a diagnosis, the condition was first recognized during the post operative course due to the drainage of sequestra of the gland (2 recovered, 1 died).

It seems to be of interest to determine how long after the acute onset of the illness operative interference should be undertaken, and what influence over the outcome the site of incision had. This is difficult because of the variety of stages in which one finds the gland, so that it was not always easy to reckon the exact date of the beginning of the acute pancreatitis, as the patients came to us for treatment some time after the onset of their illness. In some cases we have noticed during the period of observation a varying course from improvement to relapse (as in Cases 20 and 34). Thus it is not always certain from which of the various methods of operative attack the changes in the patient's condition are to be ascribed. However, from the history of the patient, or from that obtained from their attending physician, the data below have been constructed approximately.

Operation was performed on the 34 cases during the following periods:

	Recovered	Died	Total
During the first week after beginning of sickness	8	4	12
During the second week after beginning of sickness	3	1	4
During the third week after beginning of sickness	4	3	7
During the fourth week after beginning of sickness	3	4	7
During the fifth week after beginning of sickness	0	4	4
	—	—	—
	18	16	34

From this it is evident that of the 16 that were operated during the first two weeks after the beginning of the illness,

the greater percentage of them recovered (11 recoveries; 5 deaths). Of the 14 operated during the third and fourth week, only one-half recovered; the four operated in the fifth to seventh week, all died. Therefore, the chances of the success of the operation are unquestionably best when it is undertaken during the first weeks of the disease. The situation of the incision is not directly responsible for the outcome of the case, but one must consider the much greater import of the condition of the diseased gland and therefrom elect the operation which should be performed.

The earlier operative interference is determined upon, just so much greater is the probability that we will meet with the acute stage, while the later the operation is undertaken, just so much greater is the likelihood that the condition of necrosis and peri-pancreatic pus formation is to be found.

In the earlier operation we see the serous or serosanguinous exudate in the abdominal cavity, accompanied by the small spots of fat necrosis, evidenced by the characteristic sulphur yellow, split corn to bean sized flecks, which immediately calls one's attention to the diseased pancreas. These necrotic spots in the abdominal fat are very readily appreciated and occasionally one meets them in the preperitoneal fat. In other cases, one finds them first in the greater or lesser omentum, and in the fewest number of instances one finds them only in the region of the inflamed pancreas, when they are first to be seen only when the gland is freely exposed.

In those cases in which the inflammation is principally retro-peritoneal and points already in the left lumbar region, it is in this situation that they are most likely to be found. The diseased organ is hard, swollen and more or less completely infiltrated with blood. We have only found one case which was operated on early in which large spots of softening were present (Case 29). This condition usually is ushered in later when the necrotic softening of the inflamed and infiltrated tissue has begun. In three cases (5, 24, 34) accompanying the inflammatory exudate and the spots of fat necrosis there was found merely an inflammatory swelling of the

pancreas, which spontaneously recovered after sponging out and draining the exudate without the formation of any necrotic discharge.

The first case of this kind (Case 5) was operated in 1895 without our appreciating the nature of the condition, which was merely diagnosed as a gall stone colic, and from which the patient recovered. In the second operation, in 1896, for a common duct stone, in the same patient, we could find no signs of the former pancreatitis. The patient is living and is perfectly normal. This case at the time of operation was not correctly diagnosed, as at that time we did not realize the etiological relationship between pancreatitis and fat necrosis. In the light of my later experience, it is, however, unquestionable that we were dealing with acute pancreatitis, which in all likelihood was consequent to the presence of cholelithiasis. Case 34 gave us similar findings which was operated after repeated attacks of pain, without the finding of a gall stone, but there was marked induration of the head of the pancreas. After the operation the pain ceased and the patient recovered.

Case 24 was referred to me from Karlsbad after having passed through many severe attacks of pain, which were diagnosed as the result of gall stone. There were, however, none present, but a serous exudate, fat necrosis and severe inflammation of the head of the pancreas, which was incised in three places and drained. There was no recurrence of the pain, and three years after the operation the patient states that she feels perfectly well.

In eight cases (14, 17, 19, 20, 23, 28, 29, 33) operation disclosed acute hemorrhagic inflammation of the pancreas which developed in their subsequent course greater or lesser necrotic areas. Five of these recovered—three died. In three cases (21, 26, 27) we demonstrated an acute inflammatory exudate originating in the pancreas and localized in the neighborhood of the organ,—two of them in the left extremity (21 and 27), and one in the head and body of the gland. These inflammatory pseudo-cysts contained cloudy dark brown

to black brown exudate. In Case 27 there was also fresh coagulated blood. In one instance (21) gall-stones seemed to be the etiological factor of the pancreatitis. In the second case (26) the gall-passages were free from stones and inflammation. In the third case (27) the gall bladder was not opened. The pain ceased immediately after the evacuation of the hemorrhagic cyst. The fat necrosis of the omentum stopped, and there were no recognizable pieces of necrotic pancreatic tissue thrown off.

Pus formation in the head of the pancreas and in the neighborhood of it was noticed in three cases (11, 18, 44), in all of which gall stones were present. The gland was in two instances treated by raising the duodenum, the abscess bluntly opened and drained. Both patients recovered. In the third patient a small abscess was opened in the head of the pancreas and drained. There was much fat necrosis present in the gastrohepatic ligament and behind the duodenum. The patient died eight days after operation. The autopsy showed inflammation of the pancreas and a fresh hemorrhage in the tail. In the top of the papilla of Vater a stone was found. An evident cause of death was not established. There was no peritonitis present.

There were three cases of abscess in the region of the inflamed pancreas which later went on to discharge pieces of necrotic gland (30, 31, 36). Of these, two recovered (30, 31) and one died (36) from hemorrhage. In one of the last cases operated (43) we found twenty-four days after the beginning of a typical illness a large left sided subphrenic abscess which was opened through an epigastric incision. This contained reddish brown pus and appeared to come from between the space between the liver and the stomach. There was no perforation of the gall bladder, stomach or duodenum, so that it was fair to infer that the point of origin was in the pancreas (the Cammidge reaction was positive in this case alone).

When we consider these cases together, in whom there was found inflammation or pus formation, but no evidence of

necrosis of the gland, we have 21 operations undertaken in this condition, 16 of which recovered, 5 died.

Findings at operation	Recovered	Died	Total
With inflammation of the pancreas, fat necrosis and serous exudate	3	0	3
Hemorrhagic inflammation of the pancreas with later more or less discharge	5	3	8
Pus in the pancreas or in the neighborhood, without necrosis	3	1	4
Acute inflammation with formation of encapsulated inflammatory hemorrhagic effusion	3	0	3
Pus in the pancreas or in the neighborhood with later necrosis	2	1	3
Acute inflammation without necrosis	16	5	21
Extensive necrosis of the pancreas with infiltrating pus	2	11	13

Considering the series of cases in which at the operation necrosis of the pancreas was present, with pus in the omental bursa or in the retroperitoneal tissue, it appears that in the latter class there were 13 cases with only 2 recoveries and 11 deaths. It seems to me reasonable to conclude therefore that the operations which were undertaken in the acute inflammatory stage of the pancreatitis offered a much better prognosis than those which were undertaken after the occurrence of necrosis. The position in the gland in which the necrosis began varies in various cases and seems in some instances to have been dependent upon the severity of the inflammation.

In considering further the cases operated we note that during the first week of illness there were 7 in which there was either inflammation or pus formation (5, 11, 24, 27, 28, 33, 44), without, however, any subsequent necrosis. Six of these patients recovered. There were four instances of hemorrhagic pancreatitis without necrosis. Of these three recovered (14, 19, 23), in which, however, during the post-operative course more or less sequestra of the gland was discharged. One patient (28) died two days after operation,

in whom the post-mortem examination confirmed the operative findings. In one instance retroperitoneal pus and fat necrosis were found. The patient (36) died about one month after the operation from hemorrhage. The post-mortem established a very evident necrosis of the pancreas. In one patient we discovered four days after the beginning of his illness a cavity in the pancreas (29). The patient was seventy years old, and stated emphatically that four days previous, after having been entirely well, he had been suddenly seized with pain in the region of the stomach, vomiting, intestinal occlusion and collapse. He was admitted with the diagnosis of peritonitis. Owing to having a double inguinal hernia, of which that on the right side could not be reduced he was operated under local anesthesia. There was no evidence of intestinal stenosis in the hernia, but through the wound there escaped a brown nonodorous exudate, and fat necrosis of the omentum was noticed, because of which the pancreas was immediately exposed, and there was found in the head of the gland a cavity the size of a small apple, which contained some bloody fluid and detritus. The patient died three days later. The post-mortem examination showed a marked disturbance in the head and body of the gland for the greater part, and in the left part of the gland there were many small necrotic areas.

We found then up to the end of the first week inflammation or pus in the pancreas, which in some of the cases did not develop necrosis while others did. In only one instance was a spot of softening in the gland noticed in a patient operated on the fourth day. In the second week of this disease there was but one case in which an abscess was found without necrosis (18). In one there was a localized hemorrhagic inflammatory exudate, which later, during the course of convalescence discharged pieces of necrotic gland and later the formation of a fistula (26). In two other cases abscesses were found in the region of the softened gland. In the third week two cases of inflammation without necrosis were found at operation (31, 34). In a third case (20) a hemorrhagic

inflammation was present, which after throwing off sequestra completely healed. In a fourth (21), retroperitoneal pus was found, which healed eventually after the discharge of a portion of the gland. Finally there were three cases (7, 10, 35) which died, in which there was a necrosis of the pancreas and pus formation in the neighborhood. In the fourth week, there were six patients operated in which the gland had been destroyed in the greater part, in all of which there was a discolored pus surrounding it. Two of these recovered (2, 8), the remainder died. In all cases operated after the fourth week necrosis and pus was always found and all the cases died. If we add to these the six cases which were not operated, and which were subsequently examined post-mortem, we found among them one on the third, and another on the fourth day, which showed very evident necrosis of the pancreas.

Thus it is shown by our material that even as early as the third and fourth day, necrosis can occur, and these cases have a very bad prognosis. In contradistinction we have had cases in the third week in which we have met inflammation. Some have been without necrosis, and there were others in which large portions of the pancreas were thrown off, which recovered. There were also cases which did not at all, or at least very late in their course, form necrotic material which was discharged. These are the cases which are most favorable for operation, and in whom the most favorable prognosis can be given. There are a certain number of cases in which it is impossible to say how quickly the inflammation will develop into necrosis, but nevertheless we feel justified in emphasizing the fact that the very earliest moment should be employed for the operation, as it has appeared that the greater proportion of these cases offered more opportunity of recovery, in which the inflammatory hemorrhagic infiltrated gland was freely exposed and incised early, rather than those which came to operation in the stage after necrosis had occurred.

There have been various ways undertaken in order to

reach the inflamed gland and the pockets of pus. If the swollen pancreas is palpable as a transverse tender resistant tumor in the epigastrium, I have employed a median incision in the epigastrium by choice. After opening the abdominal cavity in those cases of acute inflammation the serosanguinous fluid is sponged out and the inflamed gland palpated. In a few cases it has sufficed merely to sponge out the inflammatory exudate and the inflamed pancreas in Cases 5 and 34 quickly recovered its normal condition. This course is justified only in the milder cases in which the pancreatitis has not gone on to necrosis or pus formation. These cases are certainly very seldom observed, however, and so it is a good rule to fully and freely expose the pancreas itself after a median incision.

The best approach to this gland is through the gastrocolic ligament, through which opening the inflamed organ can be plainly seen lying at the bottom of the omental bursa, when the stomach and liver have been retracted sufficiently. In occasional cases one can approach the pancreas from above the stomach by going through the gastrohepatic ligament. In this manner (26) an inflammatory hemorrhagic exudate was discovered, opened and drained, which lay behind the lesser omentum. One can also approach the pancreas by strongly retracting the incision which may have been made for inflammation of the gall bladder, after the duodenum has been mobilized, and thus inspection of the posterior portion of the head of the pancreas is made possible (12, 18).

One can also approach the pancreas through a semi-transverse gall bladder incision from above the lesser curvature of the stomach, and also anteriorly in the duodenal angle after the gastrocolic ligament has been divided. In case 24 all three of these methods of approach were used in order to expose the inflamed gland and to drain it,—as was also done in Case 44.

As it has been established that inflammation of the bile passages can pass through the papilla of Vater backwards into the pancreas, and that also the inflammation can originate

by way of the lymphatics, one should always remember in such cases, at the time of operation, never to omit to make a thorough examination of the gall-bladder. If fat necrosis is present it is an absolute indication that the pancreas should be explored. In four cases where I attempted this, while not understanding the relationship, I found later at the post-mortem examination in two instances abscesses (12, 16). In one was found an abscess cavity containing a pancreatic stone (4), and in another, a hemorrhagic inflammation of the head of the gland (9). After these observations I learned to be more particular as to the examination of the gland in later cases with similar findings. When the inflammation is unquestionably on the left side in the neighborhood of the tail of the gland one must make a secondary longitudinal incision on the left side (21), or a left sided transverse incision after the method of Sprengel (27), in order to be able to expose that portion of the gland.

Brentano found in Case 31 on exploration through the anterior incision that there was a retroperitoneal collection of inflammatory exudate which he drained from both sides through a lumbar incision. The patient recovered after the discharge of sequestra.

One can also freely expose the gland from below through the transverse mesocolon after raising up the greater omentum and the transverse colon. However, I do not think this method of approach particularly advisable because of the number of great vessels which run through the mesocolon and the danger also of infecting the lower part of the abdominal cavity by such exploration.

If one operates in the acute stage before the occurrence of necrotic softening and peripancreatic pus formation, the gland on being exposed is found hard, swollen and greatly reddened with small spots of fat necrosis scattered about it. Occasionally there is present an encapsulated inflammatory exudate in the bursa or under the greater omentum. These should be walled off with gauze separating them from the free peritoneal cavity, incised and drained (21, 26, 27).

There are various ways of treating the pancreas itself. One may either introduce gauze strips and tubes down to the anterior surface of the inflamed gland, and thus provide for drainage of the secretion, or the inflammatory tissue may be invaded in various places with a sound or other blunt instrument, and in this manner the gland may be drained directly (14, 19, 20, 23 and 24 recovered; 28 and 29 died). In this manner through puncture of the body of the gland the tissue is so opened up that the intralobular exudate can drain off, and I am of the opinion that large portions of the gland can in many cases in this manner be prevented from becoming gangrenous. Drainage is also thus provided for the throwing off of smaller pieces of gland. The five patients operated on in this manner recovered, although there was present in each instance a very severe hemorrhagic infiltration of the gland tissue, and although healing took place only after the throwing off of some smaller pieces of the gland, there was no evidence of any extensive gangrene of it.

The gall-bladder may also be exposed from the median incision, and if it should be inflamed or filled with stones or pus, owing to the condition of the disease, it should under no consideration be at that time incised and drained. During the stage of collapse, one must be contented with at the most draining the region of the gall bladder, and only after the recovery of the patient should the gall bladder operation (cystectomy) be undertaken (as in Case 19). In four cases in which cystectomy was done, as indicated above, three recovered (20, 24, 35); one died (44). In two instances the bladder was opened and drained (14, 21). In the last case a cystectomy was done later.

Very much more unfavorable is the outcome when one finds at the time of operation that the gland is already in the state of necrosis. As a result when one approaches this condition at such a time from the front adhesions are as a rule present. If this is not the case one must immediately shut off the free peritoneal cavity by means of gauze packing. After approaching the pancreas through the gastrocolic ligament one usually

comes upon a discolored purulent fluid filling the omental bursa, at the base of which there are frequently found large pieces of sequestra of the gland. After sponging out the contents, the cavity is filled with gauze and drained with a tube. In one case (7) a counter incision in the lumbar region was made. The results of the cases operated on in the state of necrosis and pus formation through an abdominal incision were without exception bad. There were in all 21 cases operated on through this approach. Of these 14 recovered and 7 died. In this series 5 patients, who were operated on in the stage of acute inflammation and softening of the gland, died (7, 10, 25, 29 [operated on the fourth day!] and 35). In contradistinction there were 15 operated on in the stage of acute inflammation or pus formation without necrosis. Of these 13 recovered, after the usual post-operative course of the throwing off of small sequestra and only two patients died—one (28) because of an accompanying nephritis two days after operation, and the other (48) eight days after operation from collapse.

The other method of operation in purulent inflammation of the pancreas and necrosis is by means of the lumbar incision. This is particularly indicated if the pus invades the retroperitoneal fat tissue and points in the left lumbar region. After a transverse lumbar incision underneath the twelfth rib the muscle is separated and the underlying peritoneum exposed, through which may be seen the necrotic material in the retroperitoneal fat tissue. After retracting the structures exposed toward the median line a blunt dissection is made at the lower pole of the left kidney into the retroperitoneal tissue, upwards and inwards toward the region of the tail of the pancreas from behind forwards. In this way the retroperitoneal pus is liberated and drained off. One is, however, unable to observe the actual condition of the pancreas itself through this approach. The lumbar incision is for the most part indicated in cases of pus formation and necrosis of the left half, and very infrequently because of inflammations of the head of the pancreas. The lumbar incision was employed

in seven cases, of which two recovered and five died. The greater part were operated on in the stage of necrosis, viz., six, with five deaths, three from hemorrhage, and one recovered (Case 2). Only one was operated on in the acute stage (the tenth day) by Brentano through a left sided lumbar incision, who eventually recovered (30).

In combination with the median incision three cases were further approached by a lumbar incision, one recovered, two died. In Case 2, which was operated on by lumbar incision seven days after the beginning of the illness, a large and discolored brownish exudate was evacuated, which was also accompanied by fat necrosis. The fever and pain in the region of the stomach and the discharge continued, and because of this, twenty days after the first operation, the gland was approached a second time through a median incision into the omental bursa, which was opened from the anterior side, and was found to contain a thick yellow pus with necrotic pieces of fat and gland tissue. In consequence of this last operation the patient died the next day. This case was operated on in 1893, and was my first attempt at operating on the pancreas; it was done at a time in which there was little experience in this condition. At the present stage of our knowledge the median incision and direct attack on the pancreas would have been undertaken with much greater chance for a favorable outcome.

In Case 31, Brentano, on exposing the gland nineteen days after the beginning of the illness through a median incision, found a swelling the size of a fist behind the head of the pancreas. The abdominal incision was closed and the retroperitoneal collection of pus was opened into through a lumbar incision on both the right and left side. Recovery followed after profuse drainage and discharge of pancreatic detritus.

In Case 36, on the sixth day after the onset of the disease, Brentano exposed the gland through a lumbar incision on the left side, without, however, finding any pus. The pancreas was then exposed from in front and found markedly inflamed with an accompanying fat necrosis. The lumbar incision was

then deepened and widened until it reached the region of the inflamed gland. From both wounds there followed a very profuse flow of pus, and through the lumbar incision some pancreatic sequestra was discharged. The patient died one month after operation from a hemorrhage from the wound. While in the first three cases of this class the anterior incision was made secondarily in order to freely expose the pus cavity, in the two other cases (31 and 36) the anterior approach was used more for verifying the diagnosis; the drainage of the inflamed gland taking place through the lumbar incision. In four other cases (8, 13, 32, 43) the inflammation and necrosis of the pancreas had gone on to the formation of a subphrenic abscess, either from a rupture through the omental bursa upwards into the subphrenic recess, or the infection had passed from the superior border of the gland through the gastro-hepatic ligament, and thus passed directly into the same space. The diagnosis in such cases is peculiarly difficult as the focus in the dome of the diaphragm is difficult to reach. The subphrenic pus has to be diagnosed through means of an exploratory puncture, and following the cannula, a transpleural opening is made. One of these cases (8) subsequent to the discharge of necrotic pancreatic tissue with an accompanying diabetes recovered. Case 43 has nearly recovered; the two others died.

In Case 13, the diagnosis was in doubt for a long time, and it was nearly four weeks from the beginning of the sickness that a resistance in the epigastrium was noticed. Somewhat later an exploratory puncture (in the eighth intercostal space) disclosed a fetid exudate in the left pleural cavity and underneath the diaphragm. The operation involved a dissection of the eighth rib on the left side for exposure of the pleural cavity, and secondarily, an incision through the diaphragm into the subphrenic space and drainage from here of the pocket of pus. The resistance in the epigastrium remained, however, and so the omental bursa was opened from in front at the same sitting, and the necrotic pancreas drained directly through it. The patient died the same day. An

earlier incision through the abdomen would have been much better. Unfortunately the physical signs were too vague, and thus the diagnosis was made too late. In the last case (32), which was operated on five days after the beginning of the illness, a lumbar incision on the left side was made, which disclosed necrotic foci in the retroperitoneal connective tissue, but no pus was found. The temperature of the patient remained up until the twentieth day after operation, when an exploratory puncture in the ninth intercostal space disclosed a pocket of pus under the diaphragm, which was opened through a lumbar incision. Seven days after this death ensued very suddenly. The post-mortem examination showed a marked necrosis of the pancreas which had ruptured through into the duodenum accompanied with hemorrhage.

The transpleural operation, which was undertaken in all three cases in the stage of necrosis and pus formation, resulted in one recovery and two deaths. Through the employment of the median abdominal incision through the epigastrium, a fourth case of subphrenic abscess was operated, which is, at the present time, nearly recovered (Case 43). In this instance, however, up to the present there has been no discharge of necrotic material.

SUMMARY OF THE VARIOUS METHODS OF OPERATION.

	Abdominal Incision—Total 21	Recovered	Died	Total
In the stage of inflammation or pus, with much necrosis	14	2		16
In the stage of necrosis and softening	0	5		5
Lumbar Incision Alone—Total 7				
In the stage of inflammation with pus	1	0		1
In the stage of necrosis and pus infiltration	1	5		6
Lumbar incision in combination with anterior abdominal incision	1	2		3
Transpleural operation	1	2		3
	—	—		—
	18	16		34

When one compares the results of the various methods of operation we find that there were 21 abdominal incisions with

14 recoveries and 7 deaths. There were 13 lumbar incisions, including the transpleural operation, with four recoveries and nine deaths. It is obvious then that the abdominal incision is without doubt the method which is to be advocated.

On more careful analysis of the cases, one, however, must appreciate that the best results are not merely the result of the method of operation employed alone, but are to a much greater degree dependent upon the peculiarity of the condition of the case at operation. Of primary importance, however, is the position of the incision. The abdominal incision was used in sixteen cases in the acute stage of inflammation or pus formation, although necrosis had occurred. Among these were a number of very severe inflammations, which subsequently developed during their course the discharge of sequestra of the gland (as in Cases 14, 19, 20, 23 and 24). There were others, however, in which the inflammatory reaction was much less severe which did not develop necrosis.

In these cases I wish to reiterate my opinion that the separation of the involved gland tissue prevented the onset of evident gangrene, and that when approached in this manner, offered a much better prognosis than those on whom the operation was performed in the stage of gangrene, as in five cases in the latter class, which were approached through the abdominal cavity, none recovered.

Further, the abdominal incision should be advised particularly in cases which are operated on relatively early, as was evident in the case of a patient operated on three days after the onset (44), who died eight days later in collapse. Also in two cases, two patients operated on the fourth day, one of which (28), although there was no necrosis of the gland, suffered, however, from a very severe nephritis.

A third case, which died (29), on the fourth day had a gangrenous cavity in the head of the gland.

The lumbar and also the transpleural incisions are on the other hand for the most part employed only in the later stages, and after the occurrence of gangrene and softening, as is indicated by the pointing of the pus pocket in the lumbar region

or in the subphrenic cavity. Of these cases, two patients recovered, one operated on through the lumbar incision (2) and one through a transpleural incision (8). These are the only two cases in our material which have recovered as a result of the operation after the occurrence of necrosis. In the stage of pus formation before the beginning of necrosis, three cases were operated on through the lumbar incision. In two of these there was an abdominal incision made also. Of these two recovered (30, 32), while one died (36). There were then five cases in which the lumbar operation was undertaken during the first two weeks. Of these two recovered.

The same analytical study of certain cases shows us also that we must consider primarily as regards the prognosis, the kind of inflammation present, as well as the point of incision, and secondarily, the method of operation. We must then strive to advise early operation in acute pancreatitis, and I believe, taking everything into consideration, that the abdominal incision in the epigastrium is by all means the best method. We can through it empty the abdominal cavity of the inflammatory exudate, and even by this alone several cases have recovered. We can also further freely expose the inflamed gland. Pus or foci of inflammation can be recognized and opened, and finally, through the agency of drainage of the gland tissue itself or the surrounding region, the secretion can be carried off and the consequent discharge of material find an exit. Also, one can learn of complicating or concomitant conditions, particularly those relative to the bile passages, in which may be found the etiologic factors, and which one may wish to treat at the same time, which can be done from the position of this incision.

The lumbar incision is to be advised in those cases where one notices early retro-peritoneal invasion, which is best to approach from the side, but in such cases it may also be very advisable to open into the lesser peritoneal cavity at the same time, and freely expose the gland from in front. When we undertake operation in the later stage it has been our experience that the best method is to employ the lumbar incision

(which includes the transpleural) as the one followed by the best results, from which procedure a few cases may be saved. The post-operative course is as a result very tedious. There is a good deal of discharge of small pieces of necrotic fat, and in eight cases during convalescence, large pieces of pancreas have been discharged.

There were four cases of fistula through which purulent pancreatic secretion was discharged. These healed spontaneously. The Pawlow-Wohlgemuth diet cure did not seem to influence these cases to any degree. In one case the descending colon prolapsed through a large lumbar incision. In another instance there was a fistula in this part of the intestine which recovered only after a plastic operation. The time of healing in all of those cases in which there was a discharge of necrotic pieces of gland or fistula formation, was very long—two to seven and a half months. In only a few of them in which there was such discharge was the healing completed before one and a half months.

The cases which have recovered we have followed very carefully for a long time, and they are all in the best of health, with the exception of the one mentioned previously, who finally recovered, after a severe necrosis, only to suffer a year and a half later with diabetes, which diagnosis was finally established at the post-mortem examination, eight years after the first illness, and which condition it was concluded could not have resulted from the pancreatic disease.

It is interesting to note the number of severe post-operative hemorrhages which occurred, six of which were immediately fatal, and in only one instance could it be stopped by tamponing. We have repeatedly noticed the large number of great vessels which run in the neighborhood of the gland. Of particular interest among these are the mesenteric vessels and the splenic vessels. The veins are very liable to thrombosis, and in four instances the splenic vein was found in this condition accompanied by large foci of metastatic abscesses in the spleen itself. The most severe hemorrhages followed

the erosion of the larger arterial branches, particularly those of the upper border of the pancreas. One patient in whom we were able to stop the hemorrhage was a man of forty-five (14), who was operated on six days after the beginning of an acute illness, through a right rectus incision. There was much fat necrosis and serosanguineous exudate present in the bottom of the lesser cavity and a very severely inflamed pancreas was noted. The gland was drained through a rubber tube and gauze strips (it was not incised). Some 894 stones were removed from the gall bladder. After recovering from a very severe post-operative collapse there followed a profuse discharge of pus accompanied by necrotic tissue. Twenty-one days post-operative there occurred a very severe hemorrhage from the depths of the wound which was controlled by means of a tampon of iodoform gauze. Subsequent recovery followed.

In a second case (31), which recovered, there occurred frequent small hemorrhages from the lumbar incision on re-dressing the wound, which were easily controlled by packing. Both of these patients who suffered from post-operative hemorrhages, but who subsequently recovered, were operated on in the acute inflammatory stage. Both of them, however, discharged large portions of necrotic tissue subsequently.

In the six cases in which the arterial hemorrhage caused death, four were operated on by the lumbar route (1, 22, 32, 36) and two through an abdominal incision (10, 15). In one case, however (32), the blood discharged itself into the perforated duodenum. It was not always possible to exactly determine the vessel which was affected. Four times, however, erosion of the splenic artery was established as the cause of the hemorrhage. There are two other cases which were not operated on, in which there was evident retroperitoneal hemorrhage, as shown by the autopsy.

The following table indicates the time after the beginning of the illness in which the patient was operated and how long after the operation the hemorrhage occurred.

Case	Occurrence of hemorrhage
1 operated about the fifth week after beginning of illness	2 weeks post operat.
10 operated about the 20th day after beginning of illness	11 days post operat.
15 operated about the 28th day after beginning of illness	13 days post operat.
22 operated about the 6th week after beginning of illness .....4th and	13th days post operat.
32 operated about the 4th week after beginning of illness	27 days post operat.
36 operated about the 5th day after beginning of illness	34 days post operat.
14 operated about the 6th day after beginning of illness	21 days post operat.

From this it is to be noted that the hemorrhage always occurred in the stage of necrosis and pus formation. Further, that it occurred in two cases which were operated on quite early, and both of which, however, subsequently discharged freely necrotic material. This liability of hemorrhage from the larger vessels is not to be lightly disregarded in those cases of acute pancreatitis which subsequently become necrotic. Early operation seems to reduce this danger considerably, but only so far as an early exposure and drainage of the inflamed gland prevents the subsequent development of tissue destruction. If this condition, however, does develop and goes so far as to create a lesion of the greater arterial vessels, we can only rely on the introduction of a tampon of iodoform gauze to stop the bleeding, accomplished once out of seven cases in our series. It is absolutely impossible to recognize and find the blood vessel in the depths of the wound.

Of those cases which died after the operation, five died on the second and third day, five on the seventh and eighth day. The remainder scattered through the time from the tenth day to the second month. In those which were not operated, the illness continued from the beginning to the death of the patient—3, 4, 5, 7, 11 and 12 days respectively. One patient (38) lived fifty-one days. This patient was a very

obese woman who came first under our notice fourteen days after the beginning of the illness, at which time she was suffering from an active bronchitis, which quickly developed into pleuropneumonia, contraindicating any operative procedure. Post-mortem examination showed inflammation of the entire pancreas which had ruptured through into the intestine, and an accompanying endocarditis and pulmonary embolism. From the findings at autopsy it was evident that in all of the cases there was a very extensive disturbance of the pancreas present. In two instances there was a typical duodenal ulcer, which had ruptured through into the pancreas, and which undoubtedly formed the etiologic factor of the subsequent inflammation which caused the death of the patients (10 and 25).

In three of the cases the pancreatic abscess had ruptured through into the intestines, duodenum and colon. In three other cases the pus had ruptured through into the free peritoneal cavity.

It is of further interest to note how many of our cases of acute pancreatic inflammation were concomitant with cholelithiasis or inflammation of the gall passages.

Of the entire forty-four cases (the operated as well as the non-operated, the latter of which, however, were all observed at autopsy) in twenty-two, or 50 per cent. of the cases, disease of the gall passages was present. In twenty-one of the cases, cholelithiasis and in one infectious cholecystitis without stones was found. In six cases there was no direct exploration of the gall bladder, and in these it is questionable, therefore, whether there was any trouble there or not. In five recovered cases, which included four with the lumbar incision and one with a high epigastric incision, the exploration of the gall passages was impossible, and in one case of lumbar incision where the patient died, no post-mortem examination was allowed. In these six patients it therefore remains questionable whether cholelithiasis was present or not. Three of these had typical histories of gall stone colic, but as it was previously pointed out, these gall stone colics can be

simulated by pancreatitis, without the presence of any gall stones or inflammation of the gall passages. In sixteen cases, either through exploration at operation or at the post-mortem examination, stones or inflammation of the gall passages was demonstrated. The appended table covers the concomitant pathologic conditions in the forty-four operated cases which includes those on which post-mortem examination was made.

Cholecystitis with stone	1	} 22 times
Cholelithiasis	21	
Diagnosis of stone or inflammation in the gall passages obtained subsequently		16 times
No absolute evidence		6 times
An etiologic correlation between the disease of the bile passages and the pancreas was seemingly evident		18 times

In three instances stones were present in the papilla—in two of these (18, 21) the stones were removed at operation. In the other (44), the stone was found at post-mortem. These stones completely occluded, as in the case related by Opie, the duodenal opening of the papilla of Vater. In the base of the diverticulum of Vater, the mouths of the gall duct and the pancreatic duct opened adjacent to each other. Here were found three instances of common duct stone, in one of which there was an accompanying stone in the gall bladder. In eleven instances the stones were found at the time of operation. In seven cases it seems reasonable to infer that from the post-mortem examination the disease of the pancreas was consequent to that of the gall passages.

Regarding the dependency of pancreatitis on the presence of cholelithiasis there has been much written lately. Osler found 105 cases of pancreatitis complicated in 45 instances with cholelithiasis. Egdahl found practically the same relationship, 105 cases with 45 instances of stones. Quénu similarly found 128 cases complicated by 47 instances of gall bladder involvement. Kehrer had only found in his large experience with gall stones five instances of necrosis of the pancreas at operation (one recovered, four died). Truhart does not

agree that all cases of pancreatitis are consequent to gall-stones, and this certainly seems correct in some cases, but in those cases in which inflammation of the gall passages has been established by operation or post-mortem examination, or where there was a stone in the common duct or where the papilla was occluded, it seems to me quite reasonable to ascribe the pancreatic inflammation to these factors. I wish, however, to emphasize the fact that in every operation which is undertaken to relieve inflammatory disease of the gall passages, it is very important to examine the pancreas at the same time, and if it is found necessary the gland should be fully exposed and the foci of disease in it opened and drained.

In a like manner, when operation is undertaken for acute pancreatitis it is of greatest importance to examine the gall passages, and if one should find these inflamed or containing concretions, these conditions should be operated at the same time if the condition of the patient warrants it. More complicated procedures, such as cystectomy or the extraction of a very deeply situated common duct stone, should only be undertaken in those patients of marked strength. Otherwise it should be deferred to a later date.

From these observations the more obvious conclusions are as follows:

The diagnosis is in many cases of acute pancreatitis very uncertain, and can never be made absolutely, owing to our not having as yet found any pathognomonic sign. Of the entire picture the peritoneal inflammation is probably the most prominent feature. The greater number of surgeons consider the presence of peritonitis, in our present knowledge of the subject, as an indication for operation, and in these cases, in looking for the point of origin, the pancreas should be considered, and particularly so when the inflammation is confined to the upper abdomen. The finding of an odorless sero-sanguineous exudate, and even of greater importance, the discovery of small flecks of fat necrosis, is direct evidence of inflammation of the pancreas. Early operation in this affection is of the greatest importance, and the results of it are much better than of those undertaken in the later stages. Of

sixteen operated on during the first week after the beginning of the illness, eleven recovered, while five died. Of fourteen operated on in the third and fourth week, one-half died. Of those operated on in the fifth to seventh week, all died.

In opposition to early operation, we must consider that the diagnosis is uncertain, and it is very difficult, particularly so for those with little experience, but as the physicians are sending their patients with peritonitis to the surgeon earlier, it is to be hoped that those with acute pancreatitis will also be sent correspondingly early. But we must appreciate that the early operation in this sickness is not by any means accompanied by such certain results as those undertaken in cases of appendicitis or in cholecystitis, whereby a timely operation and very favorable results can in the great majority of cases be prognosticated.

From my experience, it seems to me of much greater importance to consider the quality of the case and the intensity of the inflammation which we can only infer otherwise. The best results are obtained in those cases where the operation has been undertaken before the occurrence of severe irreparable changes in the gland. The best results were obtained in those cases which did not go on to necrosis, and also in those with encapsulated inflammatory hemorrhagic effusions in the neighborhood of the inflamed gland. Good results are also obtained in those cases of localized pus pockets in the pancreas or in those in which there was a very limited necrosis, as in the acute hemorrhagic inflammations. (Of eight of these, five recovered after the operation.)

A much more unfavorable prognosis is to be given to those cases which are operated on in the stage of extensive necrosis with peripancreatic pus infiltration. Of thirteen of this class of cases, only two recovered. From this it is fair to infer that only a small number of cases of acute pancreatitis reach the stage of necrosis, the majority dying from the acute inflammation before that condition is reached. From the foregoing it is evident that we must strive to operate before the occurrence of gangrene of larger portions of the gland takes place, to drain off the secretion, and, where

it is possible, limit the advance of the necrosis. The accomplishment of this measure is, however, more difficult in some cases because of the fact of the very rapid necrosis of the inflamed and hemorrhagic infiltrated gland. In fact, three or four days after the beginning of the illness it is possible in a few cases to find the gland already advanced in necrosis.

The median incision in the cases undertaken in the early stage is by all means the one to employ, as we can thus reach and treat the diseased organ and also the gall passages best. The peritoneal exudate should be immediately sponged out or washed out with hot saline. The pancreas itself should in every case be freely exposed, best through the gastrocolic ligament or from the right side by the liberation and retraction of the duodenum. The approach through the transverse mesocolon is seldom to be advised.

The important thing to consider in all operations in acute pancreatitis is that all unnecessary manipulation of the inflamed parts should be minimized, as the danger of collapse is otherwise markedly increased. The quicker one recognizes and exposes the seat of the disease, namely, the inflamed pancreas, just so much better is the prognosis. The exposed organ is, after breaking through the peritoneal covering, incised with a blunt instrument and drained with tubes and gauze strips.

The gall passages are also at the same time to be freely explored for inflammation or empyema. The lumbar incision should be reserved for those particular cases in which there is a retroperitoneal collection of pus, and also in the few cases which are operated on in the later stages. Unquestionably the retroperitoneal effusion can best be drained by timely lumbar incision. Pus in the subphrenic space is, as indicated heretofore, best reached through an incision in the epigastrium, and in questionable cases can be sufficiently drained through a transpleural operation.

In the stage of abscess formation, hemorrhage from the pancreatic and neighboring blood vessels is a very positive danger, and one which is not entirely obviated through the early operation. Also thrombosis of the larger venous chan-

nels occurs, with its consequent septic sequelæ. The pancreatic fistulæ which develop in the occurrence of tissue necrosis in acute pancreatitis have the tendency to heal spontaneously. The Pawlow-Wohlgemuth diet cure should be employed in each of these cases. Most surgeons are in accord in the main with these principles which I have established from the analysis of my material.

There are, however, a few points which are as yet unsettled, and which can only be determined by a more extensive experience. Dreesman stated at the Surgical Congress in 1909 that mild cases of pancreatitis can recover. This I agree with, and believe that among the great number of instances of stomach complaints, termed stomach and intestinal catarrh, etc., there will be found not a few which are due to one of the milder affections of the pancreas, which have gone on to spontaneous recovery. There are many places where such patients are treated with benefit, such as the renowned Springs at Carlsbad, Vichy, Neuenahr, Homburg, etc., as Pawlow has shown that sodium solutions very markedly influence the activity of the gland. I have myself seen in four instances, and Brentano records three cases, which we consider healed pancreatitis. The accuracy of the diagnosis is, however, questionable, and this must continue so until we discover some pathognomonic sign in this disease.

One can also raise the question, might not those cases in which the abdomen was opened and the exudate drained, and which healed, have recovered without any operation? This is extremely difficult to answer. Hahn, who has had a large experience and who is a careful observer, had one case which impressed him before operation as being in a dying condition, and he was surprised when the patient recovered. Halsted had a similar experience.

There are also inflammations which seem to tend to develop toward the back and which cause very severe symptoms. The release and drainage of this toxic peritoneal exudate will certainly increase the chances of recovery. The uncertainty of the diagnosis being correct should lead one to operate only in those cases where the symptoms are increasing in their

severity, for as yet we are very far from being able to say that a patient has a mild case, and will recover without operation. As we have learned from further experience, some patients, after having passed through previous milder attacks, were suddenly seized with very severe distress, which had to be treated surgically, as the expectant or palliative treatment gave no result. In the very severe cases of pancreatitis and also in those of severe hemorrhage, which quickly developed necrosis, there has been no success reached as yet from operating. Various surgeons, such as Robson and Deaver, deduced, therefore, from these cases that operative interference should not be employed. The case of Rasumowski is, I believe, reported incorrectly as being a case of apoplexy of the pancreas, which would hardly come under that category when one judges it from the operative finding. The patient, a man twenty-nine years old, was attacked with the typical symptoms of acute pancreatitis immediately after a meal. The symptoms remained stationary and continued, but he was able on the twenty-first day after the beginning of his illness to travel several hours to his home. He was operated on the twenty-fifth day, and a fluctuating tumor discovered behind the gastrophatic omentum, this was opened and found to contain a dark syrupy fluid with some blood clots. This was drained. There were no necrotic pieces of gland discharged, and the pancreatic fistula, which remained open five months, closed after the discharge of a ligature thread. I should classify this case as one of acute hemorrhagic pancreatitis, which had gone on to the formation of a peripancreatic tumor. In apoplexy of the pancreas one should consider those cases in which there is a very marked disturbance and infiltration of the gland tissue throughout a large part of its extent, which progresses rapidly to death through the continued bleeding into the gland. This was not the case in the patient operated by Rasumowski, which was done in the fourth week of the illness and did not discharge any necrotic pieces of gland. Niemier's idea that a very acute hemorrhage of the pancreas should be incised and tamponed has until now, as far as my knowledge goes, not been followed by any good results.

There are many methods in vogue regarding the treatment of the pancreas itself. The first operations for acute pancreatic disease were undertaken mostly under the diagnosis of "intestinal obstruction," and thereby much time was lost through searching the abdominal cavity, and the ever-present inclination to collapse of these cases was greatly increased. In the great majority of cases with such a condition it is very desirable to merely incise the abdomen and remove the exudate. This was satisfactory in the cases of Hahn and Halsted. Hahn drained with iodine gauze strips; Halsted closed the abdomen without drainage, as did Flynn. All of these cases recovered. While, however, in a certain class of cases this simple treatment is sufficient, it does not hold good for all cases, as in the case of severe pancreatitis which has developed necrosis, or the formation of pus. In such the simple draining off of the peritoneal exudate would be of little moment.

There have been several observations also to show that after this simple operation there have been later ones found necessary in order to cure the abscess which has formed or to remove the necrotic sequestra (Barling, Dreesman, Russel, Alsberg-Dreifuss, Bardenheuer, Ebner-Lexer, Noetzel, all of whom put forward the necessity of going directly down to the diseased organ).

At present most surgeons emphasize the necessity of freely exposing the inflamed pancreas, while there are only a few who are willing to content themselves with merely running drains and gauze down to the outside of the gland. Others counsel direct incision in the diseased organ. I personally believe that the last method is preferable, as I have previously indicated, and by employing it, believe that the inflammation may be modified and the actual necrosis anticipated. Statistics on this point, however, are not large enough yet to draw any absolute conclusions therefrom. Accidental occurrences must certainly play a large part in each case, as must also the intensity of the inflammation in certain cases and the bodily resistance of the patient, as, for instance, great obesity, which unquestionably enters into the prognosis. In any event, this

question is only of importance in those cases which are operated on in the acute inflammatory stage. As in the cases of abscess or necrosis of the pancreas the incision into the inflammatory focus or the eventual searching of the diseased gland itself is out of the question.

A few surgeons, Henle, Albrecht, and Tietze, have done a colostomy in order to empty the bowel, with good result. Henle has not even freely exposed the pancreas, and it is interesting to conjecture in that case if the patient might not have recovered without operation. There is no doubt but that the emptying of the bowel is very desirable, but the question is, will not the intestinal function re-establish itself spontaneously after the removal of the exudate? Although the four cases operated on by the previously mentioned surgeons recovered after a colostomy had been done, I do not believe that this method of treatment should be counselled as a regular procedure in operations for acute pancreatitis.

While most of the patients who recovered from their operation have remained in good health, there are reports from a few surgeons that in their patients, after a longer or shorter time, a renewal of the disease in the pancreas took place, which necessitated a second operation. (Beck, Bardenheuer, Porter, Haenel.)

The variability of these cases is very great, and I feel that the tact of the operator in certain cases must play a large part. In any event, since 1894 there has been a very great progress in our knowledge of the treatment of acute pancreatitis, since before that time these cases were regarded as rarities. Now they are being discovered with increasing frequency, and the diagnosis being made with greater surety, as our methods of diagnosis are advancing. The number of those recovering after operation is increasing each year, and thus, through the advance of our knowledge gained from the result of the treatment of the cases already mentioned, we hope that still more may be saved. The greatest advance, however, will be the discovery of a pathognomonic reaction which will positively indicate to us a disease of the pancreas.

THE INCISION FOR LUMBAR EXPOSURE OF THE KIDNEY.

BY WILLIAM J. MAYO, M.D.,
OF ROCHESTER, MINN.

It is a common experience when operating upon the kidney to find that a lumbar incision does not give adequate exposure of the pedicle, since the greater part of the kidney in the average case lies deep beneath the rib margins. Because of its anatomic relationship, the twelfth rib is the chief obstacle to a proper exposure, and for this reason many surgeons, myself included, have cut the rib when necessary, being rewarded by a remarkable increase in the operating space. In order to obtain the best results, the rib was cut as far posteriorly as possible and in doing this the pleura was accidentally opened in a considerable number of cases.

During the past two years (Nov. 1, 1909, to Nov. 1, 1911) we have performed 256 operations on the kidney. Of these, 203 were made through a lumbar incision, 7 were transverse, and 46 anterior transperitoneal. In the 203 lumbar incisions, it was found necessary to cut the twelfth rib in 51 cases and in 13 of these the pleura was accidentally opened. It is a fact worthy of note that in not a single instance did the lung collapse or any harm result to the patient from opening the pleura. When the pleural cavity was opened the air entered and escaped freely as the patient respired. In some instances the rent in the pleura was so large that the lung could be seen easily as it advanced in the act of respiration.

The operations were all made with the patient lying nearly flat on the abdomen with a moderate elevation of the loins. This position apparently serves to fix the chest so that, if the pleura be opened at the extreme lower part, collapse of the lung does not often occur. Whenever the pleura was accidentally opened we immediately sutured the opening with catgut, taking in the margin of the diaphragm, the cut

pleural margins, and the posterior muscles with a running suture. The pleural cavity was not infected in any of our cases, although a septic condition of the kidney was present in some of them, nor did the entrance of a certain amount of blood into the pleural cavity give rise to unusual symptoms. No pulmonary complications occurred in any of these cases.

It seems evident, therefore, that with the patient lying prone, accidental opening of the pleura in exposing the kidney through the lumbar region is by no means a serious matter, yet this particular bugbear (pleural injury) has been one, if not the chief, obstacle to making a rational incision for the proper exposure of the kidney through the lumbar region.

In a number of cases during the past two years, while exposing the posterior half of the twelfth rib for the purpose of division, we observed that as soon as the muscular and fibrous attachments, especially the quadratus lumborum and the lateral arcuate ligament which binds the twelfth rib to the transverse process of the first lumbar vertebra, were divided the necessity for rib division disappeared. By putting a retractor under the angle of the twelfth rib, the upper margin of the incision, including the rib, was so mobilized that exposure of the kidney and especially of the kidney pedicle was quickly accomplished. The pleura was easily pushed upward and not opened. In two of the cases, when the costal margin could not be sufficiently mobilized, the twelfth rib was broken with a lateral twist and pull of the hand, causing an incomplete fracture within its periosteal and muscular coverings near the neck, and in one very obese patient the rib was cut.

In some cases the twelfth rib is absent or rudimentary, but this is quite immaterial so far as the advantage to be gained from the high posterior cut is concerned. The incision is made as follows:

Beginning at a point two to two and a half inches lateral to the dorsal spines near the outer margin of the erector spinæ muscle, a longitudinal incision is made two to three inches in length through the skin, superficial fascia and posterior layer of the lumbodorsal fascia (vertebral aponeurosis) which covers the erector spinæ muscle. The incision lies

FIG. 1.



Lumbar incision for the exposure of the kidney.

FIG. 2.



Kidney exposed through lumbar incision.

18700

behind the twelfth rib from the angle, if present, nearly to the head, and reaches downward to a point one-half inch below the angle. From this point the incision passes obliquely downward and forward along the anterior margin of the quadratus lumborum muscle to a point an inch above the crest of the ilium, and there turning runs forward parallel to the iliac crest as far as necessary.

The posterior superior lumbar triangle (Kelly) just beneath the twelfth rib is then exposed by cutting an opening through the external and internal oblique, transversalis, and latissimus dorsi muscles, exposing the transversalis fascia in its lumbar portion. This fascia is then opened freely, exposing the perirenal fat. The ilio-inguinal and iliohypogastric nerves are identified and retracted out of harm's way and the lower part of the incision completed. The twelfth rib is then cleared in its posterior portion upward and backward nearly to the articulation of the rib with the transverse process of the twelfth dorsal vertebra, and the pleura pushed upward. By retracting the erector spinæ muscle on the one hand and the costal margin on the other, a wide exposure is accomplished at the point of previous inaccessibility. As a rule the kidney can readily be drawn through the incision to the surface with but little traction. The incision is easily closed and there is little or no danger of hernia.

The incision herein described varies from the ordinary lumbar incision only in relation to the exposure above and behind the curve or angle of the posterior half of the twelfth rib.

In operating upon kidneys which are not greatly altered in size, or in which the alteration in size is due to fluid contents which can be evacuated, we prefer the lumbar incision.

For those tumors of the kidney which present themselves as a distinct abdominal mass the anterior transperitoneal incision is best.

An extended search of the literature of incisions for lumbar exposure of the kidney has not been made, but the method is so efficient and sensible that it is probably one of the old good things which has been forgotten.

EPIGASTRIC HERNIA, A CAUSE OF CHRONIC DIARRHŒA.

WITH REPORT OF A CASE.

BY FARRAR COBB, M.D.,
OF BOSTON, MASS.

Assistant Visiting Surgeon to the Massachusetts General Hospital.

It has never been taught, so far as the writer can discover, that a chronic diarrhœa can be caused by an epigastric hernia. The following unusual case teaches this important, and what is regarded as a *new* clinical fact. It has been known that an epigastric hernia is not infrequently the cause of gastric symptoms, epigastric and abdominal pain, nausea and vomiting, which symptoms are made worse by taking food or by exertion. This knowledge has been spread by numerous writers in the last fifteen years, but that a persistent and incurable diarrhœa, without gastric symptoms and without abdominal pain, could be due to such a hernia has never been reported or understood. Medical men have overlooked frequently this form of hernia as a cause of serious stomach symptoms. No doubt such herniæ have been an unrecognized cause of no inconsiderable number of cases of so-called incurable diarrhœa. The purpose of this article is to make it plain that a careful search for epigastric herniæ must be made in all cases of chronic diarrhœa of doubtful origin, as well as in cases of gastric disturbance.

By epigastric hernia is meant those small protrusions, usually not larger than a walnut, situated in the linea alba between the umbilicus and xiphoid cartilage. This form of hernia is rare, occurring in not more than 1 per cent. of all herniæ. It occurs much more frequently in males than in females. It usually contains omentum and rarely a portion of the transverse colon. Many of the cases develop slowly and insidiously,

and suddenly give rise to symptoms. Cases accompanied by symptoms have more or less extensive adhesions to the abdominal parietes, transverse colon, or stomach. Far too little prominence has been given in text-books to this condition. It is frequently overlooked in the examination, and not many general practitioners understand what severe symptoms it can cause. For a study of etiology, development, and structural peculiarities of this form of hernia, as well as a complete discussion of the subject, writers are referred to the admirable articles by Lothrop, Lindenstein, Capelle, and others.

With regard to the symptomatology, all writers agree that the symptoms caused by this form of hernia are referred to the stomach and are always associated with pain; this pain may be constant, but is usually intermittent and is accompanied by vomiting and digestive disturbances. The only mention in literature, so far as is known to the writer, of intestinal disturbances as distinct from gastric in such cases, are two cases reported by Lothrop, both of them cases of acute colitis coincident with the hernia, one untreated and one cured by medical treatment, neither of them operated on. In neither of these could the hernia be considered as a cause.

REPORT OF A CASE OF CHRONIC DIARRHŒA YIELDING TO NO FORM
OF MEDICAL TREATMENT, CURED BY OPERATION ON
EPIGASTRIC HERNIA.

R. Y. N., sixty-nine, white, an intelligent Yankee farmer, was first seen by me on April 26, 1908, at Scituate, Mass., in consultation with Dr. T. B. Alexander. He came from a long-lived race with no family history of disease. Has always been a hard worker, and has always lived in the neighborhood. His habits have been good; no venereal disease; no excess of alcohol or tobacco. Has never been sick, except for last twelve years has been somewhat troubled with eczema on both legs. For seven months has had constant diarrhœa, for which no cause could be found. Has had from six to fourteen soft, watery movements every twenty-four hours. Very rarely he has gone all day without a movement, but when he has done so invariably at three or four o'clock in the morning he would wake up with an

imperative desire and would then have from three to five movements in rapid succession. Has never passed blood to his knowledge, but for the last three months has noticed occasionally when straining to pass urine would have an involuntary movement of the bowels. Has never had any pain or griping with the diarrhœa nor any vomiting. Has never had a cough, but occasionally has some dyspnœa on exertion. At one time he limited his diet, living mainly on eggs, milk, and toast, but recently has eaten everything because he found that dieting made no difference in the diarrhœa. Has lost much weight. His normal weight being about 150 pounds, now weighs between 110 and 115 pounds. Aside from the emaciation and weakness and the annoying eczema, he feels well.

On February 6, 1908, two and a half months before I saw him, he entered the medical wards of the Massachusetts General Hospital. Previous to that he had been a patient in the out-patient department of the same hospital, and had been treated regularly there without improvement for three months. He was in the wards for three weeks, and left the hospital no better than when he went in, notwithstanding the many and different forms of treatment which he received. Since leaving the hospital, he has had just the same kind of diarrhœa, with the same number of watery movements daily. Since then he has given up any form of treatment and all dieting. He and his family regard his case as incurable and frankly express their distrust of doctors and hospitals.

Examination found an epigastric hernia about the size of an English walnut two and a half to three inches above the umbilicus in the median line. This was tense, gave a slight impulse on coughing, was irreducible, and not tender. Because no other cause for his diarrhœa could be found, and because it had yielded to no treatment, it seemed probable that it might be due to this hernia.

The following notes on his physical condition are from the medical and surgical records of the hospital: A muscular old man showing obvious emaciation. Heart and lungs negative. Considerable degree of arteriosclerosis. Abdomen full, soft, tympanitic throughout, no masses, no tenderness. Spleen not felt, knee-jerks normal. In scrotum small swelling about size of grape above the testicle, apparently connected with the cord,

not tender and of no importance with regard to hernia or diarrhoea. Rectal examination negative. Temperature normal, pulse 80, of good quality. Respiration 27, hæmoglobin 80, white count 5000. Blood-pressure 160. Blood smear: polynuclear $55\frac{2}{3}$ per cent.; lymphocytes, $16\frac{2}{3}$ per cent.; large mononuclears, $24\frac{1}{3}$ per cent.; eosinophiles, 4 per cent.; mast cells, one-third of 1 per cent.

During the first ten days in the medical wards the urine showed a slight trace of albumin and a few hyaline and finely granular casts, but at the end of twelve days the albumin and casts had disappeared. When he was on the surgical service his urine had no albumin or casts. Frequent examinations of his stools showed always the same condition—watery, brownish-black, guaiac test negative, no eggs, parasites, or amœbæ. The stools remained negative, notwithstanding the different kinds of medicine given and the changes in the diet. During the three weeks he was in the medical wards the patient had from three to eight watery movements daily. He was given different kinds of medicine, bismuth subnitrate, bismuth salicylate, pil. camphor, opium and tannin, tannigen, betanaphthol, Squibbs' diarrhoea mixture, codeine, etc. Diet varied from boiled milk to liberal house diet. The final conclusion was that his case was one of chronic diarrhoea of doubtful etiology not amenable to treatment. "A discouraging case not likely to improve, probably due to some chronic irritation in the colon." So reads the record!

Patient left the medical wards on February 27 and re-entered the hospital on the surgical side on May 6 following. The surgical records on his physical examination add nothing to the medical records, with the exception of noting the presence of the small epigastric hernia.

It was my intention, because of the arteriosclerosis and the advanced age of the patient, and the fact that previously for a short time the kidneys had shown signs of interstitial nephritis, to operate under local anæsthesia. This, accordingly, was tried.

An incision $2\frac{1}{2}$ inches long surrounding the hernial tumor was made under local anæsthesia. A peritoneal sac surrounded by much fat was found. This sac contained omentum which had come through a small hole between the recti muscles. It was then necessary to give the patient ether because of the pain caused by manipulating the sac and omentum. Further explor-

ation showed the omentum to be strongly adherent to the parietal peritoneum as well as to the peritoneum of the hernial sac, and that it also bound by strong adhesions the transverse colon firmly against the abdominal wall at the hernial opening. After tying off and dividing the adhesions, the transverse colon could be displaced freely in any direction. Before this was done it had been firmly fixed to the abdominal wall. The wound was approximated in layers, the fascia over the recti muscles being overlapped in a longitudinal direction. Pagenstecher thread was used to suture the peritoneum to the fibro-aponeurotic structure.

The patient recovered after a moderate wound infection and after going through some ether bronchitis on the third and fifth day. At no time after the operation did he have any recurrence of the diarrhoea, nor did he require cathartics to have regular movements of the bowels. The bowels acted normally and have continued to do so ever since. There has been no recurrence of the hernia.

REFERENCES.

- Capelle: *Beiträge z. klin. Chir.*, 1909, Bd. lxiii, Hft. 2.
Lindenstein: *Beiträge z. klin. Chir.*, 1908, Bd. lvii, Hft. 2.
Lothrop: *Med. and Surg. Reports Boston City Hospital*, 1901; *Boston Med. and Surg. Jour.*, Feb., 1897; *Boston Med. and Surg. Jour.*, Nov., 1901.

A STUDY OF SPRAIN-FRACTURE.*

BY GEORGE G. ROSS, M.D.,

OF PHILADELPHIA,

Surgeon to the Germantown and Stetson Hospitals; Assistant Surgeon to the German and University of Pennsylvania Hospitals,

AND

LEVER FLEGAL STEWART, M.D.,

Resident Physician in the German Hospital of Philadelphia.

SPRAIN-FRACTURE, a condition resulting from an increase in tension on tendon or ligament, or from direct violence at the seat of tendinous or ligamentous attachment to bone, is a separation of all or part of that bone to which tendon or ligament is attached, from that bone of which it formed a part.

Callender,¹ in 1870, first described "cases in which some ligament is torn, carrying with it a film or shell of bone into which its fibres are inserted," and called them sprain-fractures. Keen, in 1874, referred to the same pathological condition as "masked fracture." Ross and Wilbert² in 1902 drew attention to sprain-fractures in connection with so-called sprains. Bennett³ in 1906 said, "sprains commonly so called are in quite a large proportion of cases complicated by slight fractures (pathologically 'unimportant');" again, "a fracture can hardly occur without a sprain at the same time, but a sprain may of course and frequently does occur without a fracture." Eisendrath⁴ says: "the recognition of sprain-fractures requires the systematic use of the X-ray in every case of severe sprain."

SPRAIN-FRACTURE AT THE GERMAN HOSPITAL.

In the German Hospital during the year 1910, 89 or 15 per cent. of the fractures confirmed by X-ray were sprain-

* Read before the Philadelphia Academy of Surgery, October 2, 1911.

fractures. During the first five months of the present year 56 cases of sprain-fracture were diagnosed, being confirmed by X-ray.

The importance of sprain-fracture as attested by its frequency and its location (for being produced most often through the agency of ligaments or tendons it is found at the attachments of these, therefore mostly at or near joints) prompted the writers to study it from a clinical and experimental point of view.

CASES VERIFIED BY X-RAY.

Case 1.—Jan. 20, 1910, W. H. R., age 37. X-ray findings: sprain-fracture lower end radius.

Case 2.—Jan. 24, 1910, Sarah D., age 47. X-ray findings: old sprain-fracture external malleolus.

Case 3.—Jan. 26, 1910, Frank S., age 35. X-ray findings: sprain-fracture internal condyle of humerus.

Case 4.—Jan. 28, 1910, Willh. F., age 63. X-ray findings: old sprain-fracture acromion.

Case 5.—Feb. 10, 1910, Philip O., age 51. X-ray findings: sprain-fracture internal condyle of humerus.

Case 6.—Feb. 14, 1910, John S., age 30. X-ray findings: sprain-fracture internal condyle of femur.

Case 7.—Feb. 16, 1910, Wm. R., age 27. X-ray findings: old sprain-fracture external malleolus.

Case 8.—Mar. 16, 1910, Herb. S., age 19. X-ray findings: sprain-fracture proximal phalanx thumb.

Case 9.—Mar. 19, 1910, Erw. W., age 22. X-ray findings: sprain-fracture internal condyle of humerus.

Case 10.—Apr. 12, 1910, B. McN., age 21. X-ray findings: sprain-fracture lower end tibia.

Case 11.—Apr. 13, 1910, Anna P., age 49. X-ray findings: sprain-fracture internal condyle of humerus.

Case 12.—Apr. 18, 1910, Phil. Pf., age 24. X-ray findings: sprain-fracture fifth metatarsal.

Case 13.—Apr. 22, 1910, Mike M., age 26. X-ray findings: old sprain-fracture internal condyle of humerus.

Case 14.—Apr. 23, 1910, M. Mat., age 45. X-ray findings: sprain-fracture astragalus and cuboid.

Case 15.—Apr. 25, 1910, J. Ha., age 36. X-ray findings: sprain-fracture first metacarpal.

Case 16.—Apr. 25, 1910, Boers., age 35. X-ray findings: sprain-fracture lower end radius.

Case 17.—May 2, 1910, Geo. H., age 49. X-ray findings: old sprain-fracture lower end radius.

Case 18.—May 3, 1910, Fr. O., age 61. X-ray findings: old sprain-fracture external condyle of humerus.

Case 19.—May 6, 1910, Elan. Es., age 57. X-ray findings: old sprain-fracture acromion.

Case 20.—May 7, 1910, Wm. J. W., age 35. X-ray findings: old sprain-fracture scaphoid.

Case 21.—May 7, 1910, Geo. M., age 36. X-ray findings: sprain-fracture radius, fracture styloid process of ulna, impaction scaphoid, semilunar, and radius.

Case 22.—May 9, 1910, Geo. C., age ?. X-ray findings: sprain-fracture external condyle humerus.

Case 23.—May 13, 1910, Roy S., age 17. X-ray findings: sprain-fracture acromion.

Case 24.—May 13, 1910, Fr. S., age 22. X-ray findings: sprain-fracture astragalus.

Case 25.—June 2, 1910, J. Gall, age 36. X-ray findings: sprain-fracture lower end radius, fracture scaphoid and ulnar styloid.

Case 26.—June 2, 1910, McB., age 48. X-ray findings: sprain-fracture upper end of tibia.

Case 27.—June 4, 1910 Dan. R., age 16. X-ray findings: old sprain-fracture upper end of tibia.

Case 28.—June 4, 1910, Lo. Lo., age 42. X-ray findings: sprain-fracture lower end radius.

Case 29.—June 16, 1910, Ed. D., age 21. X-ray findings: sprain-fracture external malleolus.

Case 30.—June 22, 1910, Ash., age 56. X-ray findings: sprain-fracture internal condyle of femur.

Case 31.—June 27, 1910, J. C., age 22. X-ray findings: sprain-fracture external malleolus.

Case 32.—June 28, 1910, M. Mc., age 41. X-ray findings: sprain-fracture external malleolus.

Case 33.—July 12, 1910, Wis., age 24. X-ray findings: sprain-fracture lower end radius.

Case 34.—July 13, 1910, A. H. D., age 50. X-ray findings: sprain-fracture external condyle of humerus.

Case 35.—July 15, 1910, Ma. L., age 55. X-ray findings: old sprain-fracture lower end radius.

Case 36.—July 16, 1910, Fr. G., age 29. X-ray findings: sprain-fracture internal malleolus.

Case 37.—July 22, 1910, Kirs., age 51. X-ray findings: sprain-fracture external condyle of humerus.

Case 38.—July 25, 1910, Wm. B., age 29. X-ray findings: sprain-fracture external malleolus.

Case 39.—July 26, 1910, Ch. M., age 53. X-ray findings: sprain-fracture acromion.

Case 40.—July 26, 1910, J. Th., age 37. X-ray findings: sprain-fracture lower end radius.

Case 41.—July 30, 1910, K. K., age 23. X-ray findings: sprain-fracture upper end tibia.

Case 42.—August 8, 1910, R. McC., age 41. X-ray findings: sprain-fracture external condyle of humerus.

Case 43.—August 18, 1910, D. W., age 25. X-ray findings: sprain-fracture external condyle of humerus.

Case 44.—August 19, 1910, M. McC., age 44. X-ray findings: sprain-fracture external condyle of humerus.

Case 45.—August 31, 1910, H. Ro., age 22. X-ray findings: sprain-fracture external malleolus.

Case 46.—September 8, 1910, R. Oz., age 16. X-ray findings: old sprain-fracture lower end fibula.

Case 47.—September 10, 1910, M. T., age 34. X-ray findings: sprain-fracture first metacarpal.

Case 48.—September 13, 1910, S. M., age 44. X-ray findings: sprain-fracture external malleolus.

Case 49.—September 17, 1910, S. B., age 50. X-ray findings: sprain-fracture acromion.

Case 50.—September 17, 1910, S. Ob., age 52. X-ray findings: sprain-fracture fourth metacarpal.

Case 51.—September 19, 1910, R. G., age 41. X-ray findings: sprain-fracture distal phalanx thumb.

Case 52.—September 19, 1910, E. Long, age 15. X-ray findings: sprain-fracture external malleolus.

Case 53.—September 20, 1910, A. U., age 28. X-ray findings: sprain-fracture external malleolus.

Case 54.—September 23, 1910, E. M., age 26. X-ray findings: sprain-fracture lower end radius.

Case 55.—September 27, 1910, M. K., age 36. X-ray findings: sprain-fracture internal malleolus.

Case 56.—October 7, 1910, J. R., age 20. X-ray findings: sprain-fracture external condyle of humerus.

Case 57.—October 11, 1910, J. Lon., age 13. X-ray findings: sprain-fracture external condyle of humerus.

Case 58.—October 13, 1910, J. B., age 44. X-ray findings: sprain-fracture external malleolus.

Case 59.—October 15, 1910, W. McG., age 44. X-ray findings: sprain-fracture external malleolus.

Case 60.—October 24, 1910, J. H., age 17. X-ray findings: sprain-fracture os calcis.

Case 61.—October 25, 1910, B. S., age 19. X-ray findings: sprain-fracture scaphoid.

Case 62.—October 25, 1910, Fried., age 20. X-ray findings: sprain-fracture external malleolus.

Case 63.—October 28, 1910, Ad. M., age 18. X-ray findings: sprain-fracture external condyle of humerus.

Case 64.—October 29, 1910, G. V., age 17. X-ray findings: old sprain-fracture os calcis.

Case 65.—October 29, 1910, J. C., age 50. X-ray findings: sprain-fracture external condyle of femur.

Case 66.—November 1, 1910, C. B., age 22. X-ray findings: sprain-fracture external malleolus.

Case 67.—November 4, 1910, L. Ab., age 54. X-ray findings: sprain-fracture os calcis.

Case 68.—November 4, 1910, Mike S., age 23. X-ray findings: sprain-fracture internal malleolus.

Case 69.—November 4, 1910, Grif., age 56. X-ray findings: old sprain-fracture head of radius.

Case 70.—November 8, 1910, Gold., age 21. X-ray findings: sprain-fracture external malleolus.

Case 71.—November 9, 1910, Geo. C., age 18. X-ray findings: old sprain-fracture internal tubercle of tibia.

Case 72.—November 10, 1910, P. Cat., age 40. X-ray findings: sprain-fracture internal tubercle of tibia.

Case 73.—November 11, 1910, H. W., age 37. X-ray findings: sprain-fracture astragalus.

Case 74.—November 11, 1910, R. Iz., age 18. X-ray findings: old sprain-fracture external malleolus.

Case 75.—November 12, 1910, Zez., age 30. X-ray findings: old sprain-fracture internal cuneiform.

Case 76.—November 21, 1910, Ch. S., age 39. X-ray findings: old sprain-fracture fourth metacarpal, distal end.

Case 77.—November 22, 1910, M. S., age 52. X-ray findings: sprain-fracture inner tuberosity of tibia.

Case 78.—November 23, 1910, Stu., age 42. X-ray findings: sprain-fracture external condyle of humerus.

Case 79.—November 23, 1910, Ma. M., age 49. X-ray findings: sprain-fracture acromion.

Case 80.—November 26, 1910, E. B., age 50. X-ray findings: sprain-fracture upper end humerus.

Case 81.—November 28, 1910, Wm. S., age 54. X-ray findings: sprain-fracture greater tuberosity humerus.

Case 82.—December 6, 1910, E. S., age 46. X-ray findings: old sprain-fracture greater tuberosity humerus.

Case 83.—December 14, 1910, J. D., age 43. X-ray findings: old sprain-fracture cuboid and os calcis.

Case 84.—December 21, 1910, Al. C., age 29. X-ray findings: old sprain-fracture external condyle of femur.

Case 85.—December 22, 1910, J. Lo., age 48. X-ray findings: sprain-fracture internal condyle of humerus.

Case 86.—December 23, 1910, M. D., age 25. X-ray findings: old sprain-fracture external malleolus.

Case 87.—December 27, 1910, Alex. K., age 41. X-ray findings: sprain-fracture both condyles of humerus.

Case 88.—December 27, 1910, J. B., age 51. X-ray findings: sprain-fracture os magnum.

Case 89.—December 28, 1910, Pat. C., age 30. X-ray findings: sprain-fracture external malleolus.

Case 1.—January 5, 1911, N. C., age 18. X-ray findings: old sprain-fracture proximal end metacarpal.

Case 2.—January 16, 1911, S. R., age 14. X-ray findings: sprain-fracture external malleolus.

Case 3.—January 26, 1911, J. J. K., age 60. X-ray findings: sprain-fracture greater tuberosity humerus.

Case 4.—January 30, 1911, Thos. C., age 23. X-ray findings: sprain-fracture head radius, comminuted fracture olecranon.

Case 5.—January 31, 1911, Al. R., age 55. X-ray findings: sprain-fracture acromion.

Case 6.—February 6, 1911, Al. M., age 21. X-ray findings: sprain-fracture lower end radius.

Case 7.—February 6, 1911, Ed. C., age 25. X-ray findings: sprain-fracture lower end radius.

Case 8.—February 7, 1911, Duer, age 42. X-ray findings: sprain-fracture external condyle of humerus.

Case 9.—February 7, 1911, I. G., age 34. X-ray findings: sprain-fracture greater tuberosity humerus.

Case 10.—February 8, 1911, Ch. C., age 30. X-ray findings: sprain-fracture internal condyle of humerus.

Case 11.—February 9, 1911, L. H., age 52. X-ray findings: sprain-fracture olecranon.

Case 12.—February 17, 1911, A. H., age 28. X-ray findings: sprain-fracture astragalus.

Case 13.—February 20, 1911, J. W., age 48. X-ray findings: old sprain-fracture greater tuberosity humerus.

Case 14.—February 20, 1911, F. P. M., age 33. X-ray findings: sprain-fracture internal condyle humerus.

Case 15.—February 28, 1911, T. D., age 46. X-ray findings: old sprain-fracture lower end radius.

Case 16.—March 2, 1911, J. C., age ?. X-ray findings: sprain-fracture lower end radius.

Case 17.—March 7, 1911, F. H., age 48. X-ray findings: sprain-fracture lower end radius.

Case 18.—March 8, 1911, L. F., age 23. X-ray findings: sprain-fracture cuneiform.

Case 19.—March 14, 1911, A. B., age 22. X-ray findings: old sprain-fracture external malleolus.

Case 20.—March 14, 1911, S. Br., age 62. X-ray findings: old sprain-fracture greater tuberosity humerus.

Case 21.—March 17, 1911, S. H., age 38. X-ray findings: sprain-fracture scaphoid.

Case 22.—March 18, 1911, Ot., age 50. X-ray findings: sprain-fracture greater tuberosity humerus.

Case 23.—March 18, 1911, L. R., age 66. X-ray findings: old sprain-fracture acromion, luxation humerus.

Case 24.—March 18, 1911, C. K., age ?. X-ray findings: sprain-fracture upper end tibia.

Case 25.—March 23, 1911, J. S., age 33. X-ray findings: sprain-fracture external malleolus.

Case 26.—March 23, 1911, M. M. C., age 30. X-ray findings: sprain-fracture post. lip head of radius.

Case 27.—March 25, 1911, Hul., age 35. X-ray findings: sprain-fracture scaphoid.

Case 28.—March 27, 1911, E. A., age 28. X-ray findings: sprain-fracture external malleolus.

Case 29.—March 27, 1911, M. H., age 28. X-ray findings: old sprain-fracture scaphoid.

Case 30.—March 28, 1911, G. W., age 25. X-ray findings: sprain-fracture acromion.

Case 31.—April 8, 1911, F. H., age 41. X-ray findings: sprain-fracture external malleolus.

Case 32.—April 10, 1911, J. G., age 48. X-ray findings: sprain-fracture distal end of third metacarpal.

Case 33.—April 11, 1911, H. M., age 46. X-ray findings: sprain-fracture lower end radius.

Case 34.—April 15, 1911, Pit., age 36. X-ray findings: sprain-fracture outer tuberosity tibia.

Case 35.—April 18, 1911, S. N., age 18. X-ray findings: old sprain-fracture greater tuberosity humerus.

Case 36.—April 22, 1911, J. R., age 72. X-ray findings: old sprain-fracture astragalus.

Case 37.—April 22, 1911, J. Mc., age 41. X-ray findings: sprain-fracture cuboid.

Case 38.—April 22, 1911, C. C., age ?. X-ray findings: sprain-fracture acromion.

Case 39.—April 29, 1911, J. C., age 37. X-ray findings: sprain-fracture styloid process of radius.

Case 40.—May 2, 1911, Ed. F., age 50. X-ray findings: old sprain-fracture greater tuberosity humerus.

Case 41.—May 4, 1911, M. N., age 50. X-ray findings: sprain-fracture cuneiform.

Case 42.—May 4, 1911, Hug., age 29. X-ray findings: sprain-fracture astragalus.

Case 43.—May 5, 1911, C. McK., age 19. X-ray findings: sprain-fracture external malleolus.

Case 44.—May 6, 1911, E. M., age 52. X-ray findings: old sprain-fracture external malleolus.

Case 45.—May 8, 1911, Koe., age ?. X-ray findings: sprain-fracture os calcis.

Case 46.—May 8, 1911, C. S., age 14. X-ray findings: sprain-fracture fifth metatarsal.

Case 47.—May 8, 1911, J. L., age ?. X-ray findings: sprain-fracture lesser tuberosity humerus.

Case 48.—May 10, 1911, Wm. T., age ? X-ray findings: sprain-fracture astragalus.

Case 49.—May 17, 1911, C. K., age 68. X-ray findings: old sprain-fracture acromion.

Case 50.—May 18, 1911, J. DeL., age 28. X-ray findings: sprain-fracture inner head tibia.

Case 51.—May 19, 1911, R. Gerl., age 40. X-ray findings: sprain-fracture distal phalanx little finger.

Case 52.—May 22, 1911, M. H., age 21. X-ray findings: sprain-fracture scaphoid.

Case 53.—May 26, 1911, M. G. Al., age 24. X-ray findings: sprain-fracture external femur.

Case 54.—May 26, 1911, Ben. G., age 47. X-ray findings: sprain-fracture acromion.

Case 55.—May 31, 1911, C. M., age ? X-ray findings: sprain-fracture lower end radius.

Case 56.—June 1, 1911, A. McD., age 26. X-ray findings: sprain-fracture inner tuberosity tibia.

Of these 145 cases, 46 were in the ankle; 25 the wrist; 25 the elbow; 23 the shoulder; 15 the knee; 9 the hand; and 2 were in the anterior foot region. With the ankle and wrist cases the tarsal and carpal bones have been respectively included. Twenty-eight of the ankle fractures were of the malleoli, and of these 24 were of the external malleolus; being within one of the number of sprain-fractures found at the wrist and over 16 per cent. of this series. Thirty-three of these cases were old (aged three weeks or more). All of these cases suffered as a result of either being treated as a sprain or receiving no treatment.

Most of these cases were caused by indirect violence; a few were caused by direct violence.

As to age, 3 were under fifteen years; 14 were between the ages of fifteen and twenty; 37 between twenty and thirty; 24 between thirty and forty; 30 between forty and fifty; 22 between fifty and sixty; and 7 over sixty. Though there are histological differences in the tissues of adults and children, the same pathology and comparative frequency of sprain-fracture is found in children as in adults.

In the experience of the writers it has been possible to diagnose clinically 77 per cent. of the sprain-fractures shown up by X-ray. Of the remaining 23 per cent., 1 was diagnosed osteoperiostitis, 1 luxation, and the rest sprain, or contusion. In a small percentage of cases that the X-ray did not demonstrate to be sprain-fractures, the diagnosis of sprain-fracture was made. These cases were probably sprain-fractures impossible of demonstration by X-ray.

SYMPTOMS.

There is always a history of application of sufficient force to cause fracture. Pain is seldom very severe. Tenderness, marked and sharply localized over a region of tendinous or ligamentous attachment, is a most important sign. Bone crepitus is very rarely elicited, however joint crepitus is not infrequently present. Preternatural mobility is seldom met with, as these injuries alone are rarely extensive enough to permit of it. Swelling usually occurs and is sharply localized, excepting when synovitis of the joint is present. Deformity is usually present, due most often to swelling at the seat of injury. Ecchymosis, a later sign, is rarely seen. Total disability never occurs and most often there is but little disturbance of function, excepting that disturbance caused by pain.

In old sprain-fractures the tenderness is latent; seldom is it absent. The symptoms of an arthritis are added when actual joint cavities have been involved. Ecchymosis, if originally present, has disappeared at this stage.

EXPERIMENTS IN PRODUCTION OF SPRAIN-FRACTURE.

The following experiments were carried out on dogs, completely anæsthetized with ether, at the Laboratory of Experimental Surgery of the University of Pennsylvania, in order to determine the strength of tendon and ligament as compared with bone. All of the dogs were asphyxiated with gas before recovering from their anæsthesia.

Experiment I.—The skin, ligamentum patella, and all tendon attachments around the left knee-joint were severed. The femur was held in a vice and the leg was grasped with the hand and hyperextended and twisted until the joint was flail-like (subluxated).

Examination showed no gross lesions of the capsule. Further opening of the joint showed the external lateral ligament partly torn from its attachment to the external condyle of the femur; the tear involved the osseous and not the ligamentous tissue (a sprain-fracture). The tear was due evidently to a lateral twist, as it did not occur in the direction of the course of the ligament.

(The above experiment was done after it was found that weight aggregating 160-175 lbs., hung from the tibia, would not make the joint give way.)

Experiment II.—The right thigh was grasped in the left hand and the corresponding leg in the right hand; twisting and hyperextension were done.

Incision and examination showed epiphyseal separation of the head of the tibia, sprain-fracture at the attachment of the patellar ligament to the tibia (the tendon pulling away with it small pieces of bone), and fracture of the crest of the tibia at the epiphyseal junction. No lesions of the knee-joint ligaments, tendons, or bones were found on exposing the joint.

Experiment III.—The left scapula was grasped in the right hand, and the corresponding humerus in the left hand. All motions encountering resistance were persisted in until that resistance was overcome.

Incision and examination showed the shoulder-joint to be undisturbed; but a badly comminuted fracture extending from a short distance beyond the glenoid fossa throughout the rest of the scapula was found.

Experiment IV.—An incision was made over the left knee-joint. The tendon of the quadriceps extensor muscle was cut and freed laterally, grasped in a vice near the tibial end of the patella, and traction was made by the use of weight pulling from the tibia in the normal direction of the tendon.

The patellar ligament separated at the point where the vice grasped it and also broke away from its tibial attachment at one corner, bringing bony tissue with it. Fibrillar tears were noted in the ligament. Failure to have the patellar ligament grasped throughout its breadth may have influenced the results. The vice grip on the ligament no doubt weakened it at this point of pressure.

Experiment V.—The tendon of the semimembranosus muscle was exposed, grasped near its centre in a vice, and traction was made by weights in its natural direction.

The tendon ruptured at the point where it was grasped. No change in its bony attachment was found. In this as in the rest of the cases the vice grip devitalized the tendon at the point at which it was grasped.

Experiment VI.—Same as Experiment IV. Examination showed no rupture of the quadriceps extensor tendon but division of bone at the point of attachment of the tendon. The tendon had pulled the bony tissue to which it was attached away from the tibia.

Experiment VII.—The tendon of origin of the right biceps was exposed and tension was made in its natural direction in the usual way.

Examination showed that the tendon had pulled away the bony cap to which it was attached. The tendon tissue showed no signs of injury.

Experiment VIII.—All skin was removed from the region of the left ankle-joint. All of the tendons passing between points above and below the joint were severed. The tibia was held tightly in a vice. A two-pronged hook was hung from the foot; one prong was hooked around the os calcis, while the other was hooked around the foot over the anterior tarsal bones; weights were hung on the hook.

Fracture of the calcaneum involving the surface articulating with the astragalus resulted. No ligamentous tears were found.

Experiment IX.—Same as Experiment IV. Examination showed no rupture of the patellar ligament but rupture of the bony tissue to which it was attached.

Experiment X.—The tendon of the right tibialis anticus was isolated. Tension was applied in the usual way.

Examination showed no tendon injury but a pulling away of the bone to which the tendon was attached.

Experiment XI.—The skin was removed from the right ankle-joint. The tendo Achillis was cut and the distal end of it was grasped in a vice, weights were added, and a pull was made in the direction which the tendon followed. The foot was held in a vice. Vice No. 1 slipped from the tendon, seemingly isolating three parts. The experiment was repeated on that part of the tendon which was overlapped by the other two parts of the tendon.

Bony tissue of the posterior surface of the calcaneum pulled away with the tendon. This portion of tendon last tested was uninjured.

Experiment XII.—Same as Experiment VIII. The hook slipped from its attachment after some pulling force had been brought to bear.

Examination showed that the anterior band of the external lateral ligament of the ankle had pulled away some bony tissue at its point of attachment to the astragalus. No injury of the ligament occurred.

Experiment XIII.—Same as Experiment V. Examination showed that the semimembranosus tendon had pulled away the bony tissue to which it was attached. The tendon was uninjured.

Experiment XIV.—Same as Experiment IV. Examination showed no injury of the patellar ligament which had pulled away the bone at its point of attachment to the tibia.

Experiment XV.—The left hip was exposed; all of the muscular attachments in this region were cut, leaving the articulation surrounded by its capsule alone. The femur was rotated externally and abducted, producing a luxation.

Examination showed a tear of the weak upper postero-external portion of the capsule and a sprain-fracture at the insertion of the ligamentum teres.

In these fifteen experiments done by using pulling force on tendons and ligaments at some distance from the attachment of them to bone, bone gave away in every test but one. This was the semimembranosus tendon which ruptured where it was gripped by the vice. In another instance besides pulling away some bony tissue the patellar ligament ruptured where it was grasped by the vice. In both cases the ligaments were weakened by the vice grip, and in the latter case the patellar ligament was not grasped throughout its horizontal extent. In a third case showing sprain-fracture at the in-

section of the ligamentum teres, luxation of the joint with laceration of the weaker portion of the capsule (that portion of the capsule, the sole function of which is to support the synovial membrane and fluid) was produced. In every other instance (12 out of the 15) bone alone gave way. These experiments show how the frequent occurrence of sprain-fracture is possible, and how rupture of tendon or ligament as a part of the pathology of so-called sprain is impossible.

One striking feature of the experiments was the occurrence of sprain-fracture in the two instances of luxation. The integrity of joints is maintained by strong ligaments, and in order to have a luxation one or more of the strong ligaments must give way; we have shown that ligaments themselves do not give way, but the bony tissue to which they are attached gives way, therefore we think that probably all luxations are permitted by the primary occurrence of a sprain-fracture.

Upon this subject the writers expect to have more to say in the future.

DIAGNOSIS.

The X-ray of course makes diagnosis conclusive when sprain-fracture is demonstrated. Through the courtesy of Dr. A. G. Miller (Skiagrapher to the German Hospital) the writers have been able to make schematic representations of some of his plates (Figs. 1 and 2, 1911, show sprain-fractures easy of demonstration). However, a negative X-ray in the presence of suggestive clinical signs should not exclude the possibility of sprain-fracture, chiefly for three reasons: first, experience and skill are required in the making and interpretation of X-ray plates (Figs. 3 and 4, 1911, and 5, show conditions such as one of little experience might find it difficult to diagnose); second, the X-ray picture if not taken in the proper plane may not show a really quite distinct sprain-fracture (Figs. 6 and 7 represent plates from cases of sprain-fracture that showed no signs of sprain-fracture in plates taken in other planes); third, some sprain-fractures are so slight as to escape the detection of the most capable

skiagrapher (Fig. 4, 1911, may be again referred to as one approaching that class).

Clinically, history of sufficient injury with a small, sharply localized area of swelling and acute tenderness over a region

FIG. 1.



Sprain-fracture of greater tuberosity of humerus.

of tendinous or ligamentous attachment is diagnostic of sprain-fracture, and should be considered as such whether or not X-ray verifies the diagnosis. Tenderness of lesser degree

FIG. 2.



Sprain-fracture of head of radius; fracture of olecranon process of ulna.

may surround an acutely tender area. Tenderness lasts as a rule from five to twenty days, longer in improperly treated cases; however, those few cases with symptoms as given above, in which tenderness disappears within forty-eight hours, are nevertheless sprain-fractures. The acute tenderness which

we have referred to is unmistakable; when the spot is firmly pressed on the patient invariably winces.

FIG. 3.

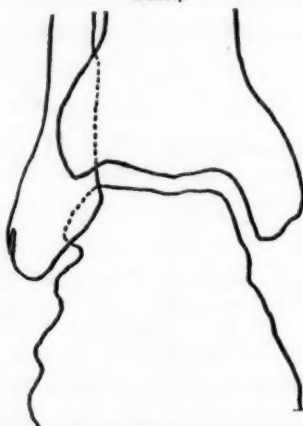


Sprain-fracture of outer tuberosity of tibia.

DIFFERENTIAL DIAGNOSIS.

Tenderness and swelling or both, not sharply localized, with the tenderness not so acute (not causing wincing on firm pressure) are occasionally found in joint regions. These

FIG. 4.

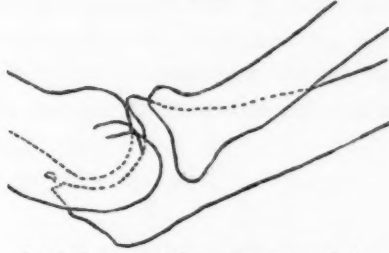


Sprain-fracture of external malleolus of fibula.

symptoms, have four causes: the first is contusion, resulting from direct injury; the second is strain, the placing of tension on tendons, ligaments, or other soft parts (nerve injury cannot be confused with sprain-fracture, as symptoms rela-

tive to its origin and distribution are associated); the third is rupture of diseased tendons or ligaments (a very rare occurrence that can be considered only as a complication of disease); the fourth is a luxation that has reduced itself.

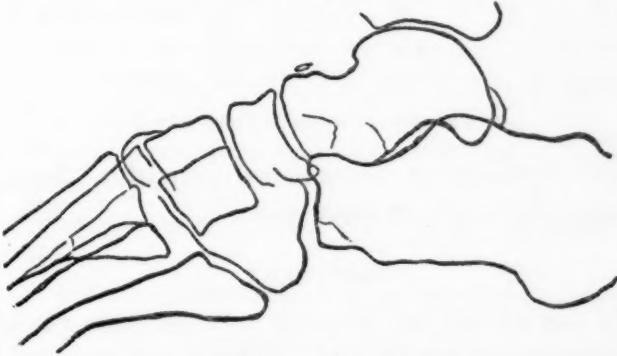
FIG. 5.



Sprain-fracture of olecranon process of ulna.

Bennett gives the old definition of sprain as "a wrench or strain resulting in stretching or laceration of the soft parts without external wound." The writers have proven that laceration of soft parts does not occur; where laceration occurs

FIG. 6.



Sprain-fracture of astragalus.

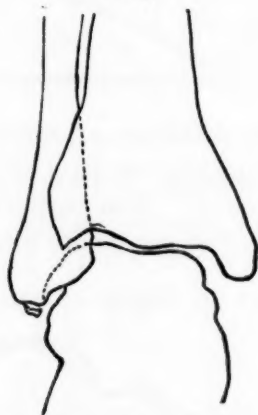
we have a sprain-fracture. The simpler term strain we have already given to the result of the placing of tension on soft parts. The word sprain, standing alone, we eliminate; but using it with fracture the condition formerly looked upon as severe sprain is described. Self-reduced dislocations show in many instances rupture of the weaker portion of the capsule. As intimated before, a more careful search for such a condi-

tion may reveal the presence of a sprain-fracture in luxations, it being of course at a different seat from the tear of the capsule.

A painful swollen joint, generally tender, with no history of injury and a negative X-ray, if you like, speaks for acute arthritis; a similar history, less marked, speaks for chronic arthritis.

A fairly large, tender, indefinite swelling following direct injury, and most likely not seated at a point of tendinous or

FIG. 7.



Sprain-fracture of external malleolus of fibula.

ligamentous attachment, points to osteoperiostitis. X-ray findings make differentiation more easy.

TREATMENT.

The seat of fracture together with the joint nearest the fracture should be immobilized. When carpal or tarsal bones are involved, the wrist- or ankle-joint should be immobilized with the smaller joints. Plaster of Paris serves this purpose best in the upper as well as the lower extremity, and rest of the body, for absolute rest is essential. Casts should be used for three weeks; at the end of this time, moderate motion may be started. Massage should be begun at the end of ten days. In an uncomplicated case, fairly free use of the injured tissues

can be allowed at the end of the sixth week. This treatment is arbitrary, and must of course be influenced by the individual case. General relaxation of joints may follow as a result of treatment, if care is not taken to avoid muscular atrophy. Proper treatment gives excellent results which are permanent.

Lack of treatment and treatment as sprain (drug-store treatment) provide many cases of chronic arthritis, deformity, persistent pain, and weakness; excessive callus formation is a common result; non-union, permitting the free bony tissue to catch between joint surfaces, can occur.

CONCLUSIONS.

1. History of sufficient injury, with a sharply localized area of swelling and acute tenderness over a region of ligamentous or tendinous attachment, means sprain-fracture.
2. X-ray is not essential for the recognition of sprain-fracture.
3. The external malleolus is probably the most frequent seat of sprain-fracture.
4. About 15 per cent. of all fractures are sprain-fractures.
5. That condition, formerly called severe sprain, is sprain-fracture.
6. The condition resulting from stretching of soft parts is better termed strain.
7. Sprain-fracture is probably a part of the pathology of every dislocation.
8. If in doubt as to whether or not sprain-fracture has occurred, treat as sprain-fracture.

BIBLIOGRAPHY.

- ¹ Callender: Fractures into Joints, St. Bartholomew's Hospital Reports, 1870, vol. vi, p. 51.
- ² Ross and Wilbert: The X-rays in So-called Sprains, American Medicine, Jan. 25, 1902.
- ³ Bennett: On Sprains and their Consequences, Mainly in Relation to Treatment, British Medical Journal, 1906, p. 1632.
- ⁴ Eisendrath: Fractures, Keen's Surgery, vol. ii, p. 141, 1911.

A DRESSING FOR FRACTURE OF THE CLAVICLE.*

BY HOWARD D. COLLINS, M.D.,

OF NEW YORK,

Surgeon to the City and J. Hood Wright Memorial Hospitals.

It is almost impossible to maintain an accurate reduction of the fragments following a fracture of the clavicle by means of the ordinary fixation dressings. Accordingly, to obtain perfect results, surgeons in these days resort to some form of spiking or suture. Nevertheless, unless the deformity be very great, the future utility of the arm is so little impaired that we are content with a faulty union that would not satisfy us in other parts of the body. Hence one is frequently justified in resorting to a fixation dressing although knowing that a more radical treatment would give more æsthetic results.

Of all the dressings in vogue, the Sayre dressing offers the best theoretical lines of force toward maintaining the reduction, and, yet, this dressing has so many disadvantages that the writer was prompted to invent something to eradicate, as far as he could, these defects.

The ordinary Sayre dressing consists of a strip of zinc oxide adhesive plaster four or five inches wide, one end of which is passed as high as possible about the arm over the biceps of the injured side so as to form a loop around the humerus; the other end is passed across the back around the other axilla and across the front of the chest as far or further than the median line in front. The loop around the humerus is left fairly loose so as not to constrict the arm, and the long end is drawn on as firmly as possible, when made to adhere to the chest. The object of the strip is to draw the shoulder as far back as possible. A second strip about three inches wide is passed under the elbow, one end extending up across the front of the chest, the other up over the back to meet on top of

* Demonstrated before the meeting of the New York Surgical Society, Nov. 8, 1911.

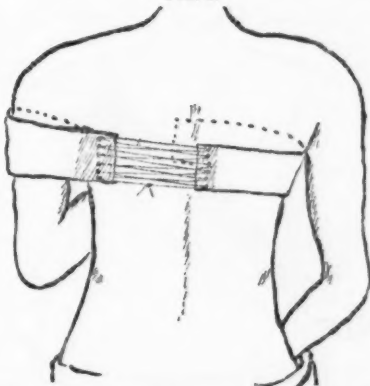
the healthy shoulder. The object of this second piece is to raise the injured shoulder and support the elbow.

The lines of force exerted by this dressing are just those desired, but the objections to the dressing are as follows:

1. The zn. oxide plaster becomes in a few days an irritant, especially in stout people.

2. After a day or two, as the body becomes adjusted to the dressing, the full force of the traction is lost, so that the reduction is no longer maintained. This necessitates the renewal of the dressing, and those of us who have removed zn. oxide adhesive plaster two or three times and reapplied

FIG. I.



Posterior view, showing arm loop and body piece. Shaded area of bandage outlines portion reduplicated or lined, so that no adhesive surface is presented to the skin at those points.

fresh plaster are only too familiar with the painful and dangerously excoriated surface of the skin produced.

It is to meet these objections the following dressing was devised:

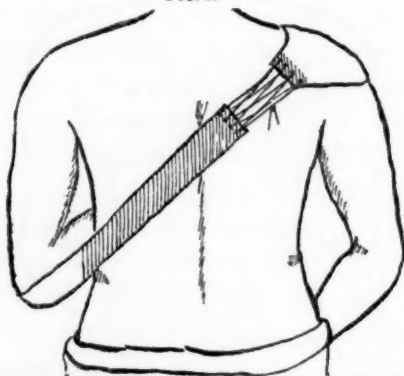
The material used consists of heavy moleskin adhesive plaster, which, while more troublesome to apply and taking longer to become firmly adherent to the skin, is non-irritating.

The lines of force are the same as those of the Sayre dressing and are applied as follows:

First, a piece of moleskin four or five inches wide is passed about the humerus as high up in the axilla as possible, and the ends, for about two inches of their length, caused to adhere to each other. This piece should be for the average about

eighteen inches long. Before applying, the whole strip should be warmed so as to cause it to adhere to the circumference of the arm. At the posterior end of this loop, *i.e.*, where the ends are adherent to each other, six holes are punched and eyelets inserted (these eyelets are similar to those through which the laces of shoes are passed and are made with a little hand punch devised for the purpose). A second strip of moleskin, the same width as the first, is passed about the body, extending from the midline behind around the chest on the healthy side as far or even across the midline in front. The posterior end of this strip is turned over on itself for about two inches and a similar row of eyelets inserted. The

FIG. 2.



Posterior view, showing shoulder cap and elbow sling.

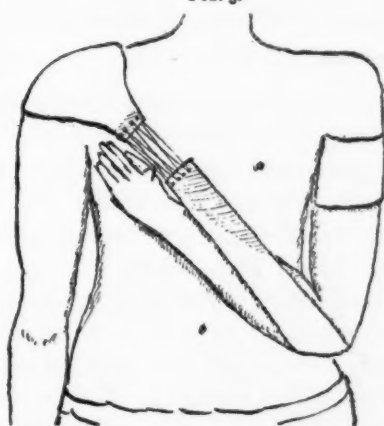
two rows of eyelets should be about six inches apart and then an ordinary corset lace put in. With this lace the ends are drawn together with the result that the shoulder can be pulled back as far as desired.

The second part of the dressing is applied as follows:

A broad piece of moleskin about seven inches wide and a foot long is applied over the healthy shoulder in the form of a cap extending well down on the arm. (In order to secure a cap-like structure, it is necessary to cut a "dart" in the moleskin.) The free ends are turned back on themselves and cut to a taper, so that the margin is not more than three inches wide. A row of four eyelets is placed in each end. The last piece of the dressing consists of a long strip of mole-

skin three inches wide, passed around the forearm of the injured side close to the elbow, one end extending up the front of the chest, the other up the back. The ends of this strip are also turned back on themselves and each has a row of four eyelets. This strip should be lined with muslin so that there is no adhesive surface exposed except where the moleskin is in contact with the forearm and elbow. A lacing joins this elbow piece with the shoulder cap in front and another is placed behind. The front and back lacings between the elbow sling and shoulder cap permit the injured shoulder to be

FIG. 3.



Anterior view, showing shoulder cap and elbow sling.

raised or, by tightening one lacing more than the other, the elbow may be brought forward or back as desired.

In applying this dressing, it should be borne in mind that the pieces should be carefully cut and fitted before the adhesive surface is warmed, and also that the laces should not be tightened before the adhesive has become thoroughly secured to the skin.

The only disadvantage of this apparatus is the length of time required for its application. This disadvantage is more than offset by the advantages, which are: (1) a non-irritating dressing that may be worn three or four weeks; and (2) the chance to tighten the lines of traction as occasion may require without removing the adhesive.

FRACTURE OF THE FLOOR OF THE ACETABULUM.*

WITH FOUR ILLUSTRATIVE CASES.

BY PENN G. SKILLERN, JR., M.D.,

AND

HENRY K. PANCOAST, M.D.,

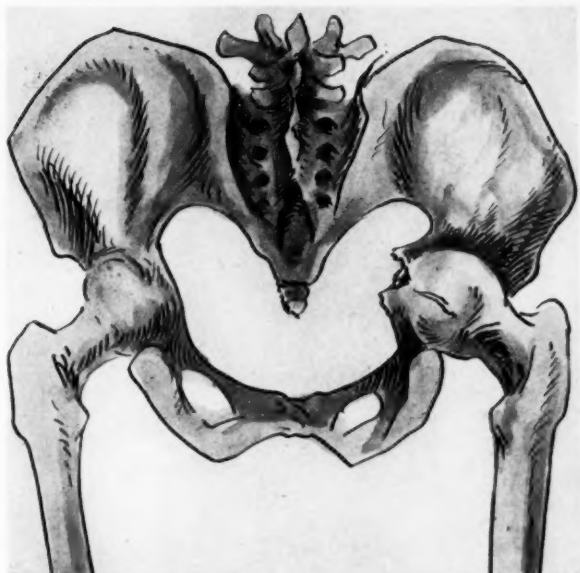
OF PHILADELPHIA.

IN dealing with this subject of fracture of the floor of the acetabulum, we shall first present four cases observed by us, then consider the cases hitherto reported in the literature, and finally discuss the subject in general.

CASE I.—G. B., male, age forty-three, coachman, admitted June 7, 1911. Fell eighteen months previous to admission a distance of eighteen feet to pavement, landing on right side on greater trochanter of femur. He was laid up for three months in the British Hospital in Hongkong, where he was treated by massage. Since then he has had a limp, which has been getting worse, as well as pain confined to upper anterior part of right thigh. Examination revealed slight atrophy of muscles in right gluteo-femoral region when compared with those of the left side, with motion slightly painful and limited in all directions, but particularly in abduction. Mensuration from internal malleolus to anterior superior spine 33 inches on both sides. The base of Bryant's triangle was equal on both sides; the greater trochanter did not rise above the Roser-Nélaton line on either side; and two lines drawn, one between the anterior superior spines and the other between the tips of the greater trochanters, were parallel. Therefore, there was no demonstrable shortening. Measurements from middle of symphysis pubis to greater trochanters equal on both sides. Therefore, there was no inward displacement of greater trochanter. Rectal examination revealed inward bulging of floor of acetabulum on injured side, but none on opposite side. The skiagram, a diagrammatic sketch of which is shown in Fig. 1, showed inward, tent-like bulging of the middle of the floor of the acetabulum, in keeping with the rectal findings on palpation. In view of the age of the injury (18 months)

* Read before the Philadelphia Academy of Surgery, October 2, 1911.

FIG. 1.



Fractura acetabuli perforans. Note stoving-in of floor of acetabulum, right side. Approximation of greater trochanter to ilium. Posterior view. Sketch from Röntgen plate. (Case I.)

FIG. 2.



Fractura acetabuli perforata. Note head displaced into pelvic cavity. Juxtaposition of greater trochanter and ilium. Left side, anterior view. Sketch from Röntgen plate. (Case III.)

FIG. 3.



Fractura acetabuli perforata. Note head displaced into pelvic cavity. Juxtaposition of greater trochanter and ilium. Left side, posterior view. Sketch from Röntgen plate. (Case III.)

FIG. 4.



Fractura acetabuli perforata. Note head in contact with sacrum and entrance of greater trochanter into pelvic cavity. Left side, anterior view. Sketch from Röntgen plate. (Case IV.)

and the trifling degree of damage to the pelvis, no measures were indicated other than massage and passive motions, which were employed with some benefit until the patient left town.

CASE II.—J. K., male, age fifty-three, plasterer, admitted October 9, 1911, to service of Dr. John B. Deaver. He had fallen from a height of 20 feet, to the ground, from a scaffold upon which he had been working, striking on the left buttock. Thereafter he could not move, and was admitted to the hospital complaining of disability and pain in hips.

He was immediately catheterized, and ten ounces of clear urine were withdrawn. Further examination revealed a large contusion with ecchymosis upon the left buttock. Pressure upon the pelvis from side to side gave sharp pain in right groin. No crepitus; no dulness in flanks. Rectal examination revealed slight bulging inward of left pelvic wall.

Skiagram showed (1) inward depression of floor of acetabulum (fractura acetabuli perforans) left side, quite identical with the damage shown in Fig. 1; (2) fracture of pubis, horizontal ramus, right side. This lesion was about an inch from the symphysis, and probably resulted from "contre coup." It accounted for the sharp pain in the right groin referred to above.

CASE III.—G. S., male, age thirty-one, admitted January 5, 1904. Fell on left hip 2½ years previous to admission. Complete history not obtainable. Skiagram shows fracture of floor of left acetabulum with head of femur displaced into pelvic cavity (Figs. 2 and 3).

CASE IV.—M. P., male, age thirty-one, admitted December 2, 1910. Fell on left hip 11 months previous to admission. Complete history not obtainable. Skiagram revealed fracture of floor of left acetabulum with displacement of femoral head into pelvic cavity (Fig. 4). This skiagram gives the impression that the femoral head is in contact with the sacrum, in which case there must be in addition either a fracture of the tip of the greater trochanter or else of the upper margin of the acetabulum.

The first recorded case of this injury was rather vaguely described by Henry Callisen in 1788 (*Principia systematis. Chirurgiæ hodiernæ*, 1788). Up to 1904 Arregger (*Deutsch. Zeitschr. f. Chirurg.*, 1904, lxxi, 487) collected 23 cases, including one of his own. In 1909 Schroeder (*Quart. Bull. of Northwest. Univ. Med. School*, 1909, xi, 1, p. 9) collected 49

cases, including three of his own. Somewhat later in 1909 A. E. Halstead added two cases, one his own, bringing the number up to 51. Our four patients make a total of 55 cases reported over a period of 123 years, thus emphasizing the relative rarity of this injury.

Nomenclature.—The Germans refer to this injury as central luxation of the femur (Zentrale Luxation des Schenkelkopfes), thus giving but secondary consideration to the fracture of the acetabulum. Analogous to this is the so-called central dislocation of the jaw, in which the condyle of the mandible is driven through the glenoid fossa at the base of the skull. English authors usually write under the title "Fracture of Acetabulum with Displacement of Head of Femur into Pelvic Cavity" or "Perforation of the Acetabulum by the Head of the Femur." None of these terms appears to us to be sufficiently comprehensive. In the first instance a moment's thought is convincing that we are not dealing with a dislocation in the accepted sense of the term. Holmes defines a traumatic dislocation as "a forcible separation of the articular surfaces of two or more bones, effected by the rupture or stretching of their ligaments." In our injury the floor of the acetabulum is not necessarily separated from the femoral head, and, furthermore, the capsule of the joint is neither torn nor stretched, but, on the contrary, it is made lax and telescoped on itself. Therefore, we have to deal with a displacement, rather than with a dislocation. Again, the injury varies from a slight depression of the floor of the acetabulum, as in Case I, to the passage of the femoral head into the pelvic cavity, as in Cases III and IV. After all, the extent of injury is only a question of the degree of the vulnerating force plus the strength of the bone. For the injury illustrated by our Case I we suggest the term "*fractura acetabuli perforans*," which implies that the head of the femur started to perforate the acetabular floor but that the vulnerating force expired before the act was completed. For cases where the head of the femur is displaced into the pelvis, we suggest the term "*fractura acetabuli perforata*," which implies completion of the act and therefore the presence of the

displaced head in the pelvic cavity. We believe with the Germans that Latin terminology is not only more exact but also far more expressive.

Etiology.—With but one exception the cause of this injury was indirect violence, most of the patients having fallen a considerable height and landed on the ground upon the greater trochanter. Others have been struck upon the greater trochanter by a heavy object.

Mechanism.—In falls from a height the acetabulum is passively broken, just as a loose hammer-head is forced upon its handle by pounding the latter upon the floor. When struck by a heavy object, on the contrary, the acetabulum is actively broken by the wedge-like action of the femoral head. The question naturally arises in your minds, when, given a certain vulnerating force, does the acetabulum yield to fracture and when the neck of the femur? While it is difficult to answer, yet several theories suggest themselves. In the first instance, in these injuries the femur has usually been slightly adducted, the force acting upon the greater trochanter in the continuation of the long axis of the femoral neck and head. The cancellous tissue in the head and neck of the femur is arranged as pressure and tension lamellæ, which spring from the inner and outer walls so as to form Gothic arches. It seems plausible, therefore, that these arches would yield least to force applied in the direction of the long axis of the head and neck, so that the force would expend itself upon the pelvis. In our injury the floor of the acetabulum, notoriously a weak place because of its thinness in all ages and of the meeting here in childhood of its three constituent bones, now fractures more or less extensively. If the force strikes the neck of the femur aslant these Gothic arches, however, fracture of the neck may sooner ensue. Variations in the angle of the neck with the shaft, in forward inclination of the neck, as well as in the index of the neck may also act as determining factors in the fracture of one or other bone. But few of the patients were superannuated, and therefore but few of the femoral necks were weakened by the osteoporosis incident to senescence. From this we might conclude that when the neck

of the femur is healthy and squarely set, so to speak, it withstands this particular force more stoutly than the floor of the acetabulum. Examination of the macerated innominate bone shows that the non-articular part of the acetabulum is thin enough to transmit light. The area in relation with the articular part of the acetabulum forms an apparently strong and stout buttress, but the thickness here consists solely in two thin shells of compact tissue between which is sandwiched a large amount of fragile cancellous tissue. Thus it is probable that many of the fractures of the acetabulum are of the variety known as "compression-fractures." As in the skull, the inner shell of compact bone would fracture more extensively than the outer. After removal of the acetabulum, it will be found that the head of the femur can penetrate into the pelvic cavity only about 3 cm., when the greater trochanter impinges upon the ilium. Fracture of the tip of the greater trochanter, however, or of the ilium would permit the head to extend further into the pelvis.

Symptoms.—The symptoms vary naturally according to whether the fracture is perforating or has perforated. The subjective symptoms are pain on motion, localized tenderness, and disability, plus those of whatever complications may exist. Given a macerated pelvis, the objective signs and complications are as easy to read as the handwriting upon the wall. There will be more or less approximation of the trochanter to the symphysis pubis along Morris's line and rectal or vaginal palpation of the stove-in acetabular floor or displaced femoral head. These two signs in conjunction with a good skiagram suffice for diagnosis. There are other signs less distinctive because common to other injuries in this region.

Differential Diagnosis.—In our opinion the most important differential diagnosis is from contusion of the hip. Far more lives will be saved by the correct diagnosis of contusion of the hip than will be lost by overlooking a more patent injury, such as Malgaigne's double vertical fracture of the ilium behind and the pubis and ischium before. The diagnosis of contusion of the hip is really very creditable when

correct, for it very properly implies deductions based upon a most careful and painstaking process of exclusion.

Complications.—The complications of this injury but reflect the regional anatomy of the pelvis, and depend upon the extent of the fracture and the shape and character of the fragments. Hæmatomata formed very frequently in the reported cases, due to laceration by a sharp fragment either of small vessels or of large ones, even the external iliac vein. If the peritoneum is likewise torn, the blood enters the peritoneal cavity as free fluid, instead of forming an extensive retroperitoneal hæmatoma. The obturator nerve, situated in the path of the fragments, is apt to be bruised, lacerated, or severed. Laceration of bowel or bladder is quite within the realms of possibility. The urethra ordinarily escapes because remote, while to reach the ureter a fragment must pass through the thick iliopsoas. The frequency of complications will be lowered in direct proportion to the care and gentleness with which the examination is conducted.

Prognosis.—In the absence of complications the prognosis is good. Stiffness, lameness, and disability of the hip-joint are liable to persist temporarily.

Treatment.—Given a patient with a fresh injury to the hip, we would ignore absolutely any academic paring of the diagnosis until we had satisfied ourselves that the bladder was not ruptured, that the intestines had not been harmed, and that no dangerous hemorrhage was in progress. Now with conscience free to act we would reduce the fracture, put the patient at rest in bed, and apply extension in the axis of the limb in conjunction with lateral traction upon the femoral neck. After a few days, if all goes well, we would apply a gypsum case from the roots of the toes to the costal margin. Having obtained satisfactory union, we would combat the effects of prolonged immobilization of the hip-joint by massage and judicious passive motion.

For the privilege of reporting these cases we are indebted to Drs. J. William White, John B. Deaver, Charles H. Frazier, and B. A. Thomas, in whose services at the University Hospital they occurred.

CLAMP FOR LINING UP FRACTURED LONG BONES.

BY WILLARD BARTLETT, M.D.,

OF ST. LOUIS, MO.

DR. RICHARD H. HARTE, in his Presidential address before the American Surgical Association, in June of this year, felt it sufficiently important to discuss the care of fractures of the long bones. Among his many excellent remarks regarding operations of the kind under consideration here, he said:

"These operations are often most difficult, requiring a special type of instruments and a thorough surgical technic (which is not in the province of every man who considers himself a surgeon), and the wounds are more prone than any other class of wounds to infection, and the risk to life and limb is thereby proportionately increased."

Since this question has been brought to the attention of surgeons, there has been a revival of interest in the treatment of fractures, especially in that most modern method of operative treatment, the use of the Lane bone plate.

The perfection of the mechanical devices and instruments for use in the Lane plate operation is so important that various eminent surgeons, having experienced this need, have offered a number of excellent suggestions. Dr. Edward Martin, of Philadelphia, presented an elaborate outfit of instruments for such use, at the Denver meeting above mentioned.

Any surgeon who has had personal experience in the use of Lane's bone plates, appreciates that, in the treatment of recent fractures, no open operation is justified unless ideal approximation is to be obtained. This means that all the fragments must dove-tail perfectly.

Great difficulty is generally experienced in perfectly lining up two main portions of a broken long bone. A few millimetres tend almost invariably to prevent the axes of both from coinciding. In addition to this is the very important

FIG. 2.

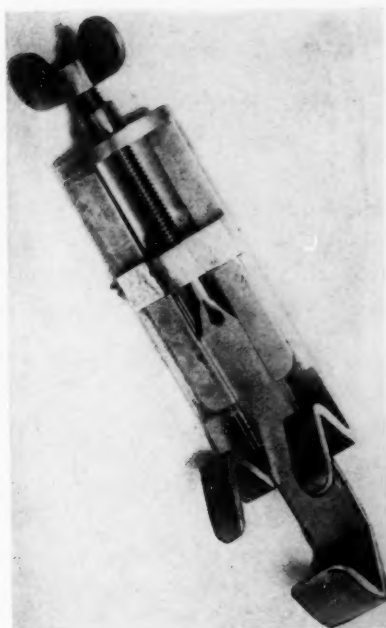


FIG. 1.

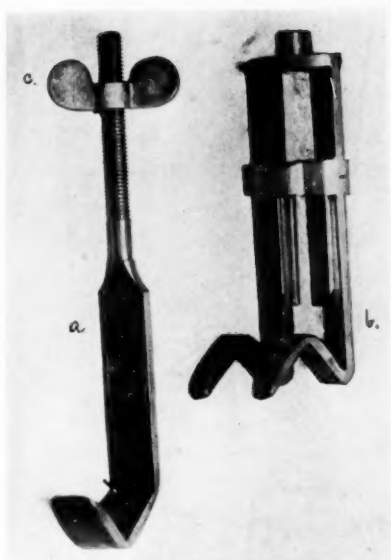
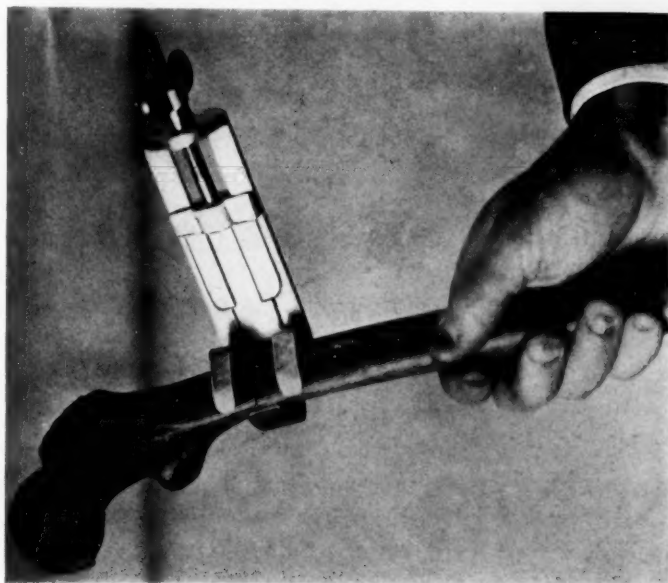


FIG. 1.—Shows three parts of instrument. (a) male blade; (b) female blade; (c) butterfly screw.
FIG. 2.—Showing front view of clamp.

FIG. 3.



Shows the clamp in position grasping bone.

1906

consideration of the unequal rotation in the two parts of the bone, which goes far in preventing an ideal approximation. These, of course, are largely mechanical difficulties which require a mechanical solution.

The instrument under consideration in this paper is designed to meet this need. In a previous article which was published in the *Journal of the American Medical Association*, Oct. 21, 1911, vol. lvii, pp. 1347-1351, entitled "Experimental and Clinical Work to Determine the Value of Lane's Bone Plating," is described an embracing instrument. This appliance was originally intended for the purpose indicated in that article. It is, however, a step in the development of the instrument herein discussed.

The three accompanying illustrations give a clearer idea of the clamp than any description in words could possibly do.

Fig. 1 shows the three separate parts of the instrument. (a) The male blade of the clamp. (b) The female blade. This slips down easily over the threads of the screw part of the male blade; it rests on the upper surface of the bone, and opposes the male blade which tends to support the fracture from beneath. (c) The butter-fly screw, used for securing clamp in position, and for regulating the exact and necessary force required.

Fig. 2 shows the various parts of the clamp in general position, when in use.

Fig. 3 shows the clamp in position grasping bone. It will be noticed that the fracture appears on the upper surface, and in plain view.

Following is the technic for using this clamp on the femur: First procedure: As soon as the bone ends are exposed, all blood-clots, early granulations, or tissue fragments should be carefully picked out of the fracture planes with a pointed instrument or brush. Second: Over-traction is then exerted on the foot until one centimetre space exists between the ends of the fragments. Third: One or the other fragment is then rotated until the bony ridges or the corre-

sponding fragments show that the bone is in proper position, or as nearly correct as the eye can judge. Fourth: While in this position, the long or male blade of the clamp can be easily slipped down under the fracture line. Then as quickly as possible, the female or upper half of the instrument should be superimposed. Screw the butter-fly nut down tight. This brings the opposing right-angled planes toward one another. Thus the fragments of the bone are brought into line. Fifth: When the correct position of the bone is thus well secured by the clamp, the traction on the broken member may then be released. The muscle tension, aided by a blow on the heel, dovetails all the fragments. It may be necessary to slightly loosen the clamp for this purpose. Sixth: The clamp is now loosened sufficiently to receive the bone plate, which is inserted in the right angle of the upper lips of the clamp, after which the nut is screwed down hard. Care should be taken that the plate is well suited in size to the fracture, and that the screw holes, or at least a sufficient number, fall on sufficiently strong bone tissue. Seventh: The drilling and screw driving may now be accomplished without any of the labor ordinarily incident to keeping the fragments in more or less accurate approximation. Should the clamp cover a screw hole, as it often does, a screw can be put in on either side of the fracture, the clamp shifted, and other screws then secured.

There are a number of advantages which especially characterize this instrument.

(1) It is open above, so that the fracture line may be seen at all times.

(2) It holds the plate firmly on the bone, and supports the whole while the screws are being driven.

(3) It is easy to place in position, since each half is applied or removed separately.

(4) It consists of four inclined planes so disposed that fragments of any shape or size are driven to a common axial centre.

FRACTURE OF THE SESAMOID BONES.*

BY GEORGE P. MÜLLER, M.D.,

OF PHILADELPHIA.

Associate in Surgery in the University of Pennsylvania; Surgeon to St. Agnes Hospital.

It is of course common knowledge that the patella is a sesamoid bone and that it is frequently fractured. There does not exist, however, a definite understanding of the fact that the other sesamoid bones may also be fractured; in none of the standard systems or text-books of surgery, nor in the monographs on fractures is there any mention of this condition.

The sesamoid bones are so named from their resemblance in size and shape to the grain *sesamum*. They are constantly present in the thumb and great toe. In 1892 Pfitzner¹ from an examination of macerated preparations—388 of the hand and 385 of the foot—found that sesamoid bones were present on the ulnar side of the fifth finger in 82.5 per cent., on the radial side of the index-finger in 48.7 per cent., and occasionally on the radial side of the third and fifth fingers. Fawcett² in 1897 made the first X-ray study of these bones and found sesamoids in the little finger in 71 per cent. and in the index-finger in 55.2 per cent., in an examination of 38 pairs of hands. Pfitzner found a sesamoid at the interphalangeal joint of the thumb in 69.3 per cent. and Fawcett in 68.5 per cent.

In the feet the sesamoids were found by Pfitzner to occur on the fibular side of the fifth toe in 6.2 per cent., on the tibial side of the fifth in 5.5 per cent., and on the tibial side of the second in 1.8 per cent. of times.

In 1904 Stieda³ observed two sesamoid bones on the plantar aspect of the interphalangeal joint of the great toe, a tibial sesamoid of the fourth toe and an X-ray showing

* Read before the Philadelphia Academy of Surgery, October 2, 1911.

9 sesamoids in the five fingers of the hand. He also made the important observation, later confirmed by Dwight,⁴ that there might exist an anomalous division of the sesamoid into two parts, a condition easily mistaken for fracture. In 1907 Momburg⁵ reported the instances of two soldiers who injured their feet while jumping from a springing board. The area of tenderness and the X-ray led to a diagnosis of fracture of the sesamoid, but upon X-ray examination of the well feet a similar division of the sesamoid was found. Momburg also records that an examination of his X-ray records reveals 9 instances of a division of the tibial sesamoid, in 3 the bone was in 3 pieces and in 1 in 4 pieces. In 6 the division occurred in both feet. In a second paper Stieda⁶ pictures the rare interphalangeal sesamoid of the index-finger, a third or accessory sesamoid at the metacarpophalangeal joint of the great toe and a curious instance of a sesamoid at the web between the great and second toes.

In 1904 Wolff⁷ reported 3 instances of a sesamoid in the tendon of the gastrocnemius; in 1909 Pancoast⁸ wrote a complete paper on this sesamoid and stated that in about 12.5 per cent. of persons there is a sesamoid in the tendon of the outer head of the gastrocnemius. He calls attention to the possibility of mistaking it for a loose or foreign body in the popliteal bursa.

Dwight notes the frequent occurrence of an isolated bone in the tendon of the tibialis posticus; he terms it the *tibiale externum*, a true part of the skeleton, being found in many mammals and being cartilaginous in the second month of the embryo. In 10 per cent. of persons it is a separate bone; in the remainder it is part of the tuberosity of the scaphoid. Painter⁹ reports a sprain-fracture of the tibialis posticus tendon in which operation revealed the isolated bone, the size of a lima bean, seeming to have a false joint between it and the body of the scaphoid.

The sesamoid bones are developed from cartilage and first make their appearance as osseous structures in the toe about the eleventh year, the others a year or two later. They

are usually met with in the substance of tendons and in the neighborhood of joints. One surface is usually covered with cartilage and either enters into the formation of the joint or, separated from it by a bursa, plays on another bone, or on cartilage or ligament. This function is to obviate friction or to change the direction or pull of a muscle. They are to be considered as parts of the skeleton all of which have their places in certain animals, but all of which either are not developed, or if they do appear are again lost in others. Thus, certain sesamoid bones of the finger are frequent in the foetus and rare in the adult (Piersol). The feet of the armadillo and the forefeet of the mole are provided with many sesamoids; in the horse one of the sesamoids is termed the navicular.

The constant sesamoids of the thumb are two in number, situated on either side of the middle line at the metacarpophalangeal joint. They are connected by a strong fibrous band which forms the floor of the groove for the long flexor tendon. Anteriorly they give attachment to the short muscles of the thumb, and posteriorly are smooth. The lateral ligaments of the joint are partly inserted into their sides.

Fracture of these sesamoids seems to have been observed but twice. In 1907 Preiser¹⁰ reported the instance of a woman, 30 years of age, who fell on the right hand and broke both of the sesamoids of the thumb, and in 1909 Morian¹¹ observed a fracture of the ulnar sesamoids in a girl age 27, who had caught the thumb in a closing door.

The constant sesamoids of the great toe are developed in the tendon of the flexor brevis hallucis and play in a groove on the head of the metatarsal. They are united to both phalanx and metatarsal by stout fibres and laterally are connected with the lateral ligaments of the joint and the sheath of the flexor tendons.

The first instance of fracture of these bones was reported by Schunke¹² in 1901; Marx,¹³ Muskat,¹⁴ Momburg,⁵ Igelstein,¹⁵ Stumme,¹⁶ Morian,¹¹ and Painter⁹ have also reported cases. Of the 16 cases reported, including my own, 14 were in males, one in a female and one not stated; the ages ranged

from 14 to 66 and averaged 37 in twelve where the age was given. Nine occurred in the right foot, 6 in the left. The external or fibular sesamoid was fractured in 1 case, the tibial sesamoid in 9 and in 5 there was a division in the sesamoids of both toes although only one side had been injured. On account of the finding of a division on both sides Momburg doubts the authenticity of the fractures he reports and both Igelstein and Painter are inclined to do likewise of theirs. That fracture is possible has been proven by the pieces excised and by the experiments of Stumme on the cadaver. He proved that forcible dorsiflexion with abduction may fracture the tibial sesamoid. He also believes that we can differentiate a fracture from an anomalous division: by the sharp edge of the line of fracture, by the oval shape of the fragments in the anomalous division, by the history of the case and a normal other toe. The character of injury in the reported cases is variously given as being due to sudden falls on the feet and the dropping of heavy weights on the toe. In 3 of the cases operative treatment was practised, the remainder being treated by plaster of Paris and supports.

I have observed the following case:

A woman, age 35, was injured two years ago by having the foot trod on while dancing. The acute symptoms soon disappeared, but there remained a residual soreness and pain on walking. Examination revealed nothing except slight tenderness over the site of the sesamoid bones of the left great toe. An X-ray made by Dr. Pfahler showed a transverse fracture of the tibial sesamoid with slight separation of the fragments, but no displacement. On June 27, 1911, I removed the sesamoid through an incision about one-half inch above and parallel to the tendon of the flexor longus hallucis. It was necessary to detach the inner head of the flexor brevis hallucis. The capsule was then cut and the joint opened. After removal of the fractured sesamoid the tendon was sutured to the capsule. The wound was closed without drainage. On October 2, 1911, the patient expressed herself as being entirely relieved of all pain and disability.

REFERENCES.

- ¹ Pfitzner, *Morpholog. Arbeit. de Schwalbe*, Jena, 1892, Bd. 8.
- ² Fawcett, *Jour. Anat. and Physiol.*, 1897, vol. xxxi, p. 157.
- ³ Stieda, *Beit. zur klin. Chir.*, 1904, Bd. 42, s. 237.
- ⁴ Dwight, *Variations of the Bones of the Hand and Feet*.
- ⁵ Momburg, *Deutsche Zeit. f. Chir.*, 1907, Bd. 86, s. 382.
- ⁶ Stieda, *Munch. med. Woch.*, 1906, Bd. 53, s. 1954.
- ⁷ Wolff, *Berlin. klin. Woch.*, 1904, Bd. 41.
- ⁸ Pancoast, *Univ. Penn. Med. Bull.*, 1909, vol. xxii, p. 213.
- ⁹ Painter, *Bos. Med. Surg. Jour.*, 1910, vol. clxiii, p. 363.
- ¹⁰ Preiser, *Arztliche Sachverstand*, 1907, s. 400.
- ¹¹ Morian, *Deutsche Zeit. f. Chir.*, 1909, vol. clxiii, s. 363.
- ¹² Schunke, *Monatschr. f. Unfallheilk.*, 1901, s. 242.
- ¹³ Marx, *Munch. med. Woch.*, 1904, Bd. 51, s. 1688.
- ¹⁴ Muskat, *Deutsche med. Woch.*, Jahr 32, s. 1319.
- ¹⁵ Igelstein, *Deutsche Zeit. f. Chir.*, 1908, Bd. 93.
- ¹⁶ Stumme, *Fortsche. auf dem Gebiet. du Röntgen*, 1909, Bd. 13, s. 312.

NOTE.—There are two instances of luxation of the sesamoids on record, viz., Karschulin (*Wiener med. Woch.*, 1906, No. 17, s. 814) and Perlman (*Deutsche Militar. Arztl. Zeit.*, 1904, s. 474).

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting held November 8, 1911.

The President, DR. CHARLES L. GIBSON, in the Chair.

OSTEOMYELITIS TREATED BY A NEW METHOD.

DR. ROBERT H. M. DAWBARN presented a man who had suffered from osteomyelitis of the bones, whose life was undoubtedly saved through two steps in surgical technic, which perhaps were new.

The patient, a Russian Jew, 50 years of age, was admitted to the City Hospital with the following history: A few months prior to his admission he had received a compound fracture of the shaft of his right femur, the point of exposure of his marrow canal being not far from the middle of the thigh. The bone-marrow had become infected, and a surgeon in another hospital had curetted from this point in both directions, with temporary benefit only.

When Dr. Dawbarn first saw the patient, he found him emaciated and running a typical septic temperature. His pus proved to be almost a pure culture of streptococcus. Under spinal analgesia, with two grains of tropacocaine, he cut down upon the bone opposite the two ends of the medullary canal, chiselling into the shaft until the marrow was freely exposed. At the upper end, this point—the beginning of the marrow canal—was opposite the level of the lesser trochanter, and was entered from the outer side of the thigh. At the lower end the canal was found to commence at a level about above the adductor magnus tubercle. At this end he entered upon the inner side of the thigh, as this made only a continuation of the wound already present.

A coarse silver wire, with a tiny loop bent upon its end, was passed in at one extremity of the canal and out at the other. A stout fish-line was fastened to this wire loop, and thus drawn through. Upon the middle of a yard of this line was fastened a tightly rolled gauze sponge, the size of which made a comfortable fit for the bony canal, and by the aid of this blunt means he thoroughly did, what for want of a better term he called "piston-ing out" the marrow, repeatedly drawing the piston-head from end to end of the canal.

Dr. Dawbarn said that although he had not heretofore published this procedure, he had now used it a considerable number of times in the course of the past few years, and thus far he had had only recoveries follow. He had used it repeatedly in the humerus and tibia as well as in the femur, and it had seemed to him that such blunt curettage must necessarily be far safer than would the thorough employment of any sharp implement, and that the danger of the infection spreading elsewhere was thus in a great measure prevented.

Of the three ways whereby any long bone was nourished, namely, (a) through the nutrient vessels, (b) those from the periosteum, and (c) those entering the bone from within the marrow canal, the last was by far the least important. Given a normal supply from the first two sources, he thought we need feel no anxiety over the loss of the third.

Dr. Dawbarn said that although he had been convinced that the removal of the entire marrow was the only wise way of handling any case where infection had begun to show itself, yet in this patient a further step in technic, new for this purpose so far as the speaker could ascertain, had so hastened the cure as compared with his previous operations of this kind that he would certainly employ it, whenever opportunity offered, immediately after pistonning and then flushing out, as he did in this instance. He alluded to filling the marrow canal entirely full of Beck's paste. The formula used was that as given by Dr. Beck in his book.

A DRESSING FOR FRACTURE OF THE CLAVICLE.

DR. HOWARD D. COLLINS showed a patient to demonstrate this, and read a description of the method employed, for which see page 88.

PYONEPHROLITHIASIS.

DR. HOWARD D. COLLINS presented a man, 35 years old, who was operated upon by the late Dr. Andrew J. McCosh 24 years ago for the removal of a bladder calculus by the suprapubic route. His recovery from that operation was uneventful.

The patient gave a markedly alcoholic history, and stated that three years ago, after a kick over the right kidney, he noticed an intermittent swelling in the right lumbar region, with attacks of pain in the kidney.

Upon admission to the City Hospital, on September 26, 1911, the swelling he described was not present, but examination revealed a hard mass just below and to the outer side of the gall-bladder. The diagnosis was made of a tumor of the right kidney. On October 11, 1911, by lumbar incision, a large, cystic kidney, weighing thirty-two ounces, was removed. The post-operative history was uneventful.

On section it was seen that most of the kidney had degenerated into multilocular cysts filled with thin pus. Many calculi were scattered throughout the cysts, and one large stone completely blocked the pelvis and ureter.

RETROPERITONEAL SARCOMA.

DR. FRANK S. MATHEWS showed a man, 50 years old, who had apparently been well until within three days of the time when he first came under observation, in April, 1911. While walking, he had been seized with a severe pain in the right iliac fossa, compelling him to go home to bed. This pain continued almost up to the time of operation, some days later.

Examination of the abdomen revealed a solid mass, extending from the ensiform cartilage to the pubes. It was a little more prominent on the right side, suggesting a solid growth of the right kidney, excepting that there was an area of tympany in the right loin.

Operation, April 26, 1911: An incision made through the right rectus muscle revealed a tumor, with intestine running over it. The incision was continued through the entire extent of the muscle, about a foot in length, until the tumor could be delivered. It lay behind the peritoneum, to the left of the cæcum, and behind the lowest part of the ileum. The latter was divided close to

the ileocæcal valve and again three feet higher up. The tumor with its attachment was then enucleated from below upward until a pedicle containing an artery of considerable size was encountered. The pedicle was divided behind the transverse duodenum, and in the course of these manipulations, a rent an inch and a half long was made in the duodenum, which was sutured as carefully as possible because of the lack of peritoneal investment.

The end of the ileum and ileocæcal valve were now closed with sutures, and a lateral anastomosis completed between the ileum and the transverse colon under the omentum. The peritoneum and blood supply of the cæcum had been too much compromised to make it safe to use the cæcum for anastomosis.

The tumor, which weighed twelve and a half pounds, was an œdematous fibrosarcoma. Convalescence, so far as the operation was concerned, was uneventful, but during the second week the patient developed a serous pleurisy on the right side, and a dry pleurisy on the opposite side. These were assumed to represent a mild grade of infection, extending from the sutured duodenum to the mediastinum. Otherwise, the patient's convalescence was uninterrupted, and he had remained well since leaving the hospital.

FOREIGN BODY (STAPLE) IN THE MEDIASTINUM.

DR. MATHEWS presented a boy, 15 years old, who was sent to the hospital because of an unresolved pneumonia of three months' duration. He had a persistent elevation of temperature, and at times spat up considerable quantities of pus. The breathing sounds were very faint over the entire left chest, with flatness on percussion over the lower two-thirds, and dullness at the apex. No tubercle bacilli were found in the sputum.

An X-ray picture was taken, which showed a wire staple lying one inch to the left of the median line in the sixth interspace, posteriorly. A picture taken from the side showed that the staple lay one inch in front of the vertebral column. Upon inquiry, the boy stated that he had swallowed the staple years before; his father said it was about seven years ago, and he also recalled that there had been no cough nor other immediate symptoms.

In order to locate the foreign body more exactly, a tube

filled with bismuth was inserted into the œsophagus, and with this *in situ*, radiograms were taken which showed that the staple lay three-quarters of an inch to the left of the œsophagus, while with the lateral views the shadows of the staple and of the bismuth tube in the œsophagus partly overlapped.

Foreign bodies in the bronchus, Dr. Mathews said, usually appeared in the radiograms in the fifth space posteriorly, *i.e.*, between the origin of the fifth and sixth ribs. In this case, on account of the low situation of the foreign body, its proximity to the median line, the long time that it had been present, and the symptoms to which it gave rise, it was thought probable that it lay in an abscess cavity communicating with the left bronchus. Consequently, it was determined to attempt its removal by resection of a portion of the seventh rib close to its angle.

By elevating the arm, the scapula and trapezius muscle were got out of the way, and the seventh rib was resected. The exposed lung was fairly soft to the touch, and with the pulsating aorta and the vertebral body as guides, an effort was made to introduce the finger between lung and pleura toward the root of the lung. Bleeding was profuse, and neither staple nor abscess cavity were located.

Subsequent to this operation, a probe, three and a half inches long, was inserted through the operation wound to represent as nearly as possible the exploring finger, and with this in position, two radiograms were taken. Both showed that the point of the probe was separated from the staple by about one-quarter of an inch. At a second operation it seemed at first as though the tip of the finger felt the staple, but only for an instant, and after as prolonged a search as was deemed safe, and the removal of a part of the sixth rib to facilitate exploration, further efforts to locate the staple were given up. The patient had scarcely been returned to bed when he had an attack of vomiting and expelled the staple, which presumably had been dislodged into the bronchus by the exploring finger.

The staple measured half an inch from point to point, and was much corroded. Following the operation, the sinus rapidly healed and the lung symptoms had largely cleared up. The case was remarkable on account of the length of time the staple had remained imbedded without causing symptoms.

GUMMA OF THE LIVER AS A SEQUEL TO YAWS.

DR. HENRY H. M. LYLE presented a man, a native of West India (Grenada), 49 years old, whose father and one uncle died of carcinoma of the stomach. The patient gave a history of having had gonorrhœa 15 years ago, and yaws (frambesia), 39 years ago. There was no history of syphilis. He had complained of gastric trouble for 30 years, and at various times he had been treated for gastritis, ulcer, and carcinoma.

Since February, 1911, the patient had complained of a constant gnawing pain in the stomach. This came on about an hour after eating, and persisted until the following meal or until relief was obtained by vomiting. Recently, the pain had become constant and had kept him awake at night. A month ago he noticed a fulness in the upper epigastrium. He complained of weakness, and had lost 40 pounds in weight. A blood examination was negative, an analysis of the stomach contents showed hyperacidity.

An examination showed that the patient was much emaciated. No glandular involvement could be made out. There were several old scars on the arms and legs which were said to have been the result of yaws. In the midline of the abdomen, one inch below the ensiform cartilage, there was a smooth, hard mass, which apparently lay below the edge of the liver. Dilatation of the stomach caused this mass to disappear. The spleen was not enlarged. The case was regarded as one of carcinoma of the stomach starting from an old ulcer.

At the operation, a smooth, round tumor, about the size of a mandarin orange, was found on the anterior surface of the left lobe of the liver. The liver was enlarged and congested. The stomach, pancreas, and spleen were normal, and the mesenteric glands were not enlarged. As an extended search failed to reveal any other lesion, a diagnosis of gumma of the liver was made and the abdomen was closed.

Of two Wassermann tests that were made, the first was negative, the second doubtful. After an intravenous injection of salvarsan a third Wassermann test was made, which was positive. Under specific treatment, the tumor had disappeared and the liver had grown smaller.

The interest in this case, Dr. Lyle said, rested largely on

the possible relationship between yaws and syphilis. The patient with two other members of his family was isolated in a hospital given over to the treatment of yaws. Under these circumstances it is reasonable to assume that the diagnosis of yaws was correct.

It has been said that an attack of yaws gave an immunity to syphilis. If this is the case the patient must have had his syphilis before his yaws.

In reply to a question as to the nature of yaws, Dr. Lyle said it was supposed to be very closely allied to syphilis. It was caused by a spirochæta, and there had been much discussion as to whether or not it was a variety of syphilis. It had also been found that in the Fiji Islands, where yaws was very prevalent, the natives were practically immune to syphilis. The primary lesions were found on the skin surface, usually the hands or feet.

THE BOTTLE OPERATION FOR HYDROCELE OF THE TUNICA VAGINALIS.

DR. LYLE presented a man, 38 years old, who had been operated on for a simple hydrocele of the left tunica vaginalis. From a clinical and operative standpoint, this case appeared to be an ideal one for the "bottle operation." In a series of ten cases in which this operation had been done by him, there had been three failures. The first of these failures could not be justly charged to the operation, as the patient had a chronic cardiac condition which might have been a factor in the passive congestion of the reversed sac. In the second case, the surgical indications for this operation were apparently perfect. The failure was a complete surprise, and led Dr. Lyle to think that it must be due to an error in technic, such as constricting the cord by the reversed sac. As this patient refused further operative interference, the cause of the increased size of the sac and testicle remained problematic.

In the third case with the previous failures freshly in mind, the operation was carefully and deliberately carried out. The hydrocele tumor disappeared, but its place was gradually taken by a tumor which was composed of thickened sac and testis. This secondary condition was little or no better than the primary. Two months later, the reversed sac was excised, when the sac

wall was found to be half an inch thick. No microscopic examination was made.

DR. A. V. MOSCHCOWITZ said he had abandoned the "bottle operation" for hydrocele for practically the same reason as that given by Dr. Lyle, although it was still occasionally done at Mt. Sinai Hospital, and in one case where it was done six weeks previously, the patient had since been re-admitted with a recurrence. As a matter of fact, Dr. Moschcowitz said, there was a good theoretical reason why the operation should not be done. In the majority of instances, the testis was fastened to the bottom of the scrotum by the remains of Hunter's ligament or the ligamentum scrotale. To perform the operation properly, this ligament ought to be cut and the whole tunica everted and sutured. But if this is done, it is just as easy, in fact easier, to cut it away entirely, in other words to do a Bergmann operation, which has of late years been his operation of choice.

DR. F. KAMMERER said he was rather surprised to hear of the bad results following this operation, which he had been doing a number of years. He could not recollect that it had ever been followed by a recurrence in his hands or by any other untoward symptoms.

The operation seemed to him simpler and less formidable than the extirpation of the entire tunica vaginalis according to Von Bergmann, and, if the results were as good, it should have preference.

DR. GIBSON said he thought the Winkelman operation had hardly been described a year before discouraging reports began to come in about it. Personally, he did not look upon the Von Bergmann operation as a formidable one, because after the exposure of the tunica vaginalis most of the operation was practically done.

CHRONIC PERISIGMOIDITIS WITH PARTIAL VOLVULUS.

DR. LYLE presented a man, 50 years old, who entered St. Luke's Hospital in September with the diagnosis of acute intestinal obstruction. Two months ago he began to suffer from attacks of pain and distention in the left iliac region. These symptoms were distinctly localized. The attacks, as a rule, were preceded by severe frontal headache, and relief was obtained by movement of the bowels.

Two days prior to his admission to the hospital, he had a splitting headache, which compelled him to give up his work. He took a cathartic which set up violent peristalsis, resulting in ten or twelve movements of the bowels. These were at first fecal, but soon became mucoid and bloody. Following this, the patient was seized with a violent pain in the left iliac region, and he vomited several times. With the onset of the pain, the movements of the bowels ceased abruptly. No gas was passed.

Upon admission, the patient presented the picture of an acute intestinal obstruction. There was moderate general distention of the abdomen, with marked local distention and tenderness in the left iliac region. The patient's temperature at this time was 100° ; pulse 120. There was a moderate leucocytosis, with no relative increase in the polymorphonuclears.

After lavage and repeated enemata, the distention was reduced, and some gas was passed per rectum. As the symptoms were apparently improving, an operation was deferred, the patient meanwhile being kept under close observation. With the reduction of the distention, a distinct mass was made out, which gave the impression of a thickened intestine. The most probable diagnosis seemed to be an obstruction from a new growth.

Upon operation, the sigmoid was found to be covered with broad, veil-like adhesions; the lower edge of this veil was tough and fibrous, and it extended from the parietal peritoneum across the sigmoid. Around this as an axis the sigmoid had partially revolved. The band was freed, and the sigmoid straightened out. The presence of the veil-like adhesions showed an attempt on the part of nature to limit a dilated and movable sigmoid.

CONSTRICTION OF THE LOWER END OF THE DUODENUM.

DR. F. KAMMERER showed the specimen in this case. The patient was a man of 40, who came to the hospital with the history of gradually increasing inability to retain food, and for two weeks prior to his admission he had been vomiting continually, and was in a condition of extreme emaciation. Every attempt to take food induced vomiting, the vomitus containing much bile.

Palpation of the upper abdomen was negative. No peristalsis nor contraction of the stomach could be observed; there was no jaundice. On opening the abdomen, the previous diag-

nosis of an obstruction beyond the ampulla of Vater was confirmed. The stomach and pylorus were normal, although somewhat distended. The duodenum was very much distended. On raising the greater omentum and exposing the root of the mesentery, a tight stricture was found at the duodenojejunal junction. The body of the pancreas contained a hard mass, toward which the strictured intestine was drawn, and to which the stomach was also adherent.

Posterior gastro-enterostomy was done. On the day following operation the patient showed the beginning of a toxic condition—high temperature and pulse, dry tongue, restlessness and twitching—to which he gradually succumbed on the third day. An examination of the lungs, heart, and abdomen offered no explanation of this condition, and there was no indication whatever of peritonitis. Vomiting had ceased after operation, and during the last two days of life the patient took a fair amount of liquid food. At the autopsy, a cancer of the body of the pancreas was found which had gradually invaded the intestinal walls at the point of stricture. The head of the pancreas was not involved, and the duodenum, although intact, was still slightly distended. There was no trouble at the site of the gastro-enterostomy, union being perfect.

ACUTE INTESTINAL OBSTRUCTION DUE TO INTUSSUSCEPTION.

DR. DAWBARN showed a photograph of this case, which was one of acute intestinal obstruction high in the ileum, due to intussusception, in which some thirty inches of small intestine were excised. The patient died shortly after the operation. He had suffered a week, and perhaps longer, from complete obstruction, and the photograph shows that upon the proximal side of the intussusception the bowel was not only dead, but on the verge of separating by sloughing from the living intestine.

EXPERIMENTS ON HIGH INTESTINAL OBSTRUCTION.

DR. JOHN A. HARTWELL briefly reported the results of some experiments performed by Dr. J. P. Hoguet and himself in the Cornell Laboratory to determine the cause of death in high intestinal obstruction. He reviewed the literature and outlined the three accepted theories concerning this phenomenon, namely,

first, the reflex nervous action on the cardiovascular centres; second, the bacterial invasion outward from the intestinal lumen either into the peritoneum or into the blood itself; third, the absorption of toxins from the intestine, these toxins being derived either from the bacteria, from food decomposition, or from secretory activity of the glands of the intestine, the pancreas, and the liver.

The experiments of Dr. Hartwell and Dr. Hoguet did not deal with the first theory, but the experimenters agreed with the majority of authors that no good evidence in support of this reflex action had been forthcoming, and that the other two theories, at the present time, had much more in their favor.

The obstruction in these experiments was produced in two ways: first, by sectioning the gut in the upper jejunum; and second, by applying a special clamp in such a way as to produce obstruction, with no interference with the circulation. All obstruction was done between the pancreatic duct and a point 34 cm. distal to the pylorus. The operation was done at varying times after the animal had eaten—from 6 to 72 hours. By the first method, one cat and six dogs were operated. These animals lived an average of 67 hours, the longest period being 160 hours. The length of life did not seem to be influenced either by the interval of time elapsing after the last pre-operative feeding or by the distance between the pylorus and the obstruction, within the limits above named. Bacterial examinations were made from the femoral blood, from the liver, the spleen, and the peritoneum in many of the cases, and as a result, organisms, principally the colon bacillus, the Welch bacillus and a Gram negative coccus were found in nearly every instance in some or all of the tubes. These examinations were made, however, some hours post-mortem, as the animals invariably died in the night.

A microscopical study was made of the kidney, spleen, pancreas, and liver in many of the cases. Very marked lesions were found in the kidney tubules and in the liver-cells in the shape of granular degeneration, and in some instances an actual necrosis. Sections of the intestine above the obstruction also showed marked evidence of an acute inflammation, but no actual ulcerations were present.

By the second method, the obstructing clamp, eight animals were operated on. The average life here was about 140 hours,

two dogs living for ten days. These dogs were not allowed to die, but were killed when it was apparent that they could not live through another night, and the bacteriological examinations were immediately done. The cultures in these cases were uniformly sterile, while the microscopical changes were the same as in the other cases. These animals seemed much less sick from the start than the first series, and they lived twice as long. The behavior of the dogs in both series after operation was much the same, and the one striking and constant symptom was progressive emaciation and weakness. The temperature was in some cases a little elevated, but the average was about 38° C. The pulse in some cases was rapid, but not uniformly so, a count of 140 often being made, which was not very much above the normal. There were never any evidences of dyspnoea. No convulsions were noted and only occasionally a rigidity of the muscles of the hind legs. This was never very marked. The dogs all drank water freely and vomited it promptly, washing out bile and mucus. They were given no food post-operative. Vomiting was not a prominent symptom excepting when the water was taken, although some did vomit at other times late in the disease. The last five dogs operated on were given normal saline solution subcutaneously in amounts of 150 to 300 c.c. per day, and this seemed to exert a very beneficial effect.

The results of these experiments were compared with those done by other workers, and it seemed that the use of the clamp without disturbance of the circulation and the hypodermoclysis exerted a very decided influence in lessening the severity of the toxic symptoms and prolonging life. The experiments were entirely inconclusive in determining the actual source of the toxins.

The following summary of the facts observed was given:

1. A high intestinal obstruction in dogs (*i.e.*, 10 to 30 cm. distal to the pylorus, but always distal to the pancreatic ducts) may not cause death for ten days.

2. There is no direct relation between the length of life and the distance of the obstruction within the above limits below the pylorus.

3. Starved dogs—48 to 72 hours—may die just as promptly as those fed 10 to 20 hours before the obstruction. Decomposition of food residue does not, therefore, seem to be an essential

factor in causing death. Operation done on a full stomach—fed under six hours—may be accompanied with much shock.

4. Bacterial invasion of the blood and organs does not necessarily occur.

5. Dogs in which the obstruction was produced without damage to the gut wall lived twice as long and seemed less poisoned than those in which the obstruction was accompanied by local damage.

6. Hypodermoclysis of normal saline was very beneficial.

7. Microscopical examination of the tissues showed marked degenerative changes similar to those produced by many toxic materials, both bacterial and non-bacterial.

Dr. Hartwell and Dr. Hoguet acknowledged their indebtedness to Drs. Elser, Ewing, and Lusk, of the Cornell Medical School, for very valuable aid in conducting the experiments. All the animals were fully narcotized with ether during all operative work.

DR. GEORGE WOOLSEY said that in the experiments reported by Dr. Hartwell, the effects of the intestinal obstruction seemed to be of a toxic nature. Experiments have shown that the filtered contents of the obstructed intestine in man when injected into animals produce no effect or a very uncertain one. The symptoms due to the injection of the contents of the intestine of animals, artificially obstructed, into other animals are not those of intestinal obstruction. The pulse and blood-pressure counts in cases of advanced intestinal obstruction resemble those of collapse or hemorrhage. V. Brun draws the conclusion that the cause of death in intestinal obstruction, unaccompanied by peritonitis, is an intense congestion of the splanchnic vessels, which has the same effect as a hemorrhage into them, causing central anæmia. This is borne out by the findings in operations in such cases in which the splanchnic vessels, especially the veins, are intensely congested. Whether this explanation would apply also to cases of obstruction high up in the intestine, which was the subject of Dr. Hartwell's experiments, the speaker was unable to say.

DR. VOSBURGH said that in a number of cases he had observed, the obstruction was usually low down; hence, hardly pertinent to the subject under discussion. In one case of intussusception in a child where the obstruction had lasted for five days, the patient showed no evidences of toxæmia, and the abdomen was soft

and flat. The picture presented was more one of shock than of toxæmia, and the condition found at operation was simply disintegration of the bowel. In other cases where the intussusception was of shorter duration, say within 24 hours, the children scarcely seemed sick at all, and the diagnosis was made on the absence of stools and the presence of blood and mucus. When these children were relieved by devagination of the intussusception, they usually recovered promptly and completely without any evidence of toxæmia. Dr. Vosburgh said that, in his opinion, the toxæmic theory which had been offered as an explanation for the symptoms in cases of intestinal obstruction was still unproven.

DR. HARTWELL, in closing, said that in his paper he did not go into the symptoms that had been given for determining the presence of these poisonous substances, because it did not seem to him that they proved the point. There was no positive proof at present that *any particular toxic substance* was developed. On the other hand, there was no proof to support the reflex theory, and the theory of bacterial invasion had been thrown out, so that the toxic theory was the one that was now being elaborated in search of proof.

Dr. Hartwell, in reply to a question, said that so far as he knew, no experiments had ever been made to determine how long animals might live when deprived of both food and water, but it certainly would be a matter of many days provided they received saline subcutaneously as these dogs did. In reply to Dr. Woolsey, who referred to splanchnic congestion and shock after intestinal obstruction, Dr. Hartwell said that in their experiments there was no shock nor marked congestion. Dr. Vosburgh's cases referred to obstruction low down in the intestinal tract, which was an entirely different matter, and the cases could not be compared to those where the poisons were blocked up in the duodenum.

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 2, 1911

The Vice-President, Dr. G. G. DAVIS, in the Chair.

EXCISION OF THE ASTRAGALUS FOR FRACTURE-
DISLOCATION.

DR. ASTLEY P. C. ASHHURST presented a man aged 45 years, who was admitted to Dr. Frazier's service in the Episcopal Hospital on August 2, 1911. He had just fallen a height of about 8 or 9 feet, into a hole, landing on his feet, and injuring the left ankle.

Examination showed considerable swelling around the left ankle, but the skin was unbroken. The foot was held in slight plantar flexion but could not be brought up to a right angle with the leg; plantar flexion was possible to the same degree as in the uninjured foot. Lateral motions were very painful and limited. The leg bones were uninjured. The head of the astragalus could be felt beneath the skin, anterior to its normal position, but still articulating with the scaphoid, and retaining its normal relation to the cuboid; beneath the tendo Achillis the posterior margin of the astragalus could be felt indistinctly. The foot was in slight "cavus" position, the anterior tarsus and metatarsus dropping.

A skiagraph (Fig. 1) showed a transverse fracture through the neck of the astragalus, the posterior fragment being dislocated backward leaving only about half of its articulating surface still in contact with the mortise of the ankle-joint. The relation of the posterior half of the astragalus to the calcaneum was not disturbed. The anterior fragment of the astragalus was dislocated forward and outward, the fragments of the astragalus being separated by about one inch and a half.

FIG. 1.



Fracture-dislocation of astragalus.

FIG. 2.



Fracture-dislocation of astragalus. Condition after excision of astragalus.

FIG. 3.



Showing result seven weeks after excision of astragalus for fracture-dislocation.

The dislocation was irreducible, so it was determined to incise the soft parts and if reduction still was impossible, to excise both fragments of the astragalus.

Operation, August 5, 1911, three days after injury. No Esmarch band was employed. An incision about two and a half inches long was made from below the external malleolus forward to the extensor tendons. A hæmatoma was evacuated from between the fragments; the external lateral ligament of the ankle was found ruptured; the fragments of the astragalus were about an inch and a half apart, and a few loose fragments were present, also belonging to the astragalus. Reduction of either fragment proved impossible. The anterior fragment was then excised without much trouble; but removal of the posterior fragment was very difficult, though finally it was delivered entire, after division of the tendo Achillis (subcutaneous tenotomy). The ruptured external lateral ligament was sutured with chromic catgut, and the wound was closed with buried and skin sutures of the same material. A small rubber tube was introduced into the ankle-joint for drainage, and the foot and leg were encased in plaster of Paris. The time of the operation was about an hour and a half.

The day after the operation the rubber tube was removed through a small window cut in the gypsum case, but the case itself was not removed for six weeks. There was no rise of temperature after the operation, and the wound was found cleanly healed and the sutures absorbed at the first dressing, six weeks after operation. Another gypsum case was worn for a week longer, and the patient encouraged to use the foot in walking.

The photograph (Fig. 3) made seven weeks after operation shows slight thickening and shortening of the foot. Flexion and extension are very nearly normal in extent and painless. Lateral motion is restricted, but sufficiently free, and painless. There is scarcely any disability, and the patient already can walk several squares. Fig. 2 is a skiagraph made eight weeks after operation.

DR. GEORGE P. MÜLLER reported a somewhat similar case seen in the University Hospital in Dr. Frazier's service. The patient, a man 50 years old, had an iron beam fall on his foot. There was a dislocation of the internal cuneiform, inwards and forwards, and a fracture of the second metatarsal, the fragments remaining in good position. He was unable to reduce the dislocation under

anæsthesia or after making an incision, and accordingly sawed off the projecting portion. There is now good function.

DR. G. G. DAVIS recalled a case of dislocation of the scaphoid in which the bone was still out; it was an old case. It seems that the bone never goes back again, its position not altering much. Dr. Ashhurst's case shows that the good results are lasting, even after as big a bone as the astragalus is removed.

DR. T. TURNER THOMAS had seen two cases of subastragaloid dislocation, in one of which he knew there was a fracture and in the other he believed there was. His own case, which was not compound, was a subastragaloid dislocation with a fracture of the astragalus. He had a great deal of trouble trying to reduce the dislocation. He looked up the literature, and found in most of the reported cases of subastragaloid dislocation there was great trouble in reduction. It seemed to him that when dislocation is associated with fracture of the astragalus the reduction becomes extremely difficult. Some cases, for some reason, go back easily, others, and these the majority, do not go back in spite of the pushing and pulling. His patient, a man of 60 years, was thrown from a horse; the foot was turned at right angles to the leg. Under ether a vigorous attempt at reduction was made, which was only partially successful. The following day after a consultation with Professor J. William White, the patient was again etherized after Dr. Thomas had made an effort to study out the problem on the cadaver, using one of Dr. Davis's anatomical specimens, upon which he based a theory as to the difficulty to be overcome, and he secured an easy apparent reduction. He put on a plaster case. A week later he took off the case but the reduction was not complete, and he had since had a good deal of trouble with that foot. The last time he saw the patient he was somewhat worse than when he took off the case. In some of these cases the patients have not only lost their limbs, but in some instances their lives.

He had the opportunity of seeing another case with Dr. A. C. Wood at the Philadelphia Hospital less than a year ago. His own case had been of the internal variety while Dr. Wood's was of the external variety. Under ether a pull was made on the foot (Dr. Wood fixed a sling about the foot) and the whole thing slipped easily into place.

A STUDY OF SPRAIN-FRACTURE.

DR. LEVER S. STEWART (by invitation) read a paper with this title, for which see page 70.

DR. GEORGE G. ROSS said that this question of sprain-fracture is one in which he had long been interested. He had felt that the so-called explanation of sprains was very inadequate. Text-books all say that a sprain is an injury about a joint in which the tendons are stretched or torn. Tendons and ligaments are made of white fibrous connective tissue which is absolutely inelastic and of great strength, being the strongest tissue in the human body. He had felt that it was very difficult, if not impossible, to tear or break a normal tendon or ligament. Fortunately the X-ray then came along to help confirm the suspicion that it was the attachment of the tendon or ligament that gave way, and not the tendon or ligament itself. John Ashhurst's Surgery, next to the last edition, has a footnote in which reference is made to Callender's remark on sprain-fracture. He asked Dr. Stewart to take up this matter last summer and do some experimental work. The present paper records the results of this work. It seemed to him that the pathology as explained by Dr. Stewart's experimental and clinical work is conclusive proof that sprain is fracture, and being fracture should be so treated. This fracture has been termed the drug-store fracture, for after a treatment with liniment it comes to the surgeon with what is called a sprained joint which does not get well but remains painful the rest of the patient's life, because it was a fracture that was not properly treated. It seems important enough to warrant treatment of the same as a gross fracture of a bone. The way it occurs is that sufficient violence, not necessarily great in extent, is exerted when the tendons and ligaments about the joint are in a certain state of tension, as, for instance, when a person turns on the side of the foot, putting the external ligament on a great tension, and then a little additional twist is all that is necessary to detach the ligament.

DR. ASTLEY P. C. ASHHURST remarked that sprains, as he understood them, are injuries to joints consisting in the rupture or laceration of ligaments, due to indirect violence. If ligaments do not rupture in their body they must be torn through in their attachments to the bone. There are certain sprain-fractures

so typical and recognized that they have received distinct names, such as *Schlatter's disease*, or "starting" of the upper epiphysis of the tibia; the *epicondylitis* of Momborg, or sprain-fracture of the external epicondyle at the elbow. Then there are such cases as Dr. Wharton reported to this academy several years ago, and of which he had seen several instances, a sprain-fracture of the tuberosity of the fifth metatarsal. However, this last often is due to direct injury, the patient tramping on the outside of the foot. These three types especially he thought deserving of recognition as typical injuries, but most others he should consider as sprains. To have sprain-fractures occurring in 15 per cent. of all sprains increases the total number of fractures to an alarming degree.

DR. T. TURNER THOMAS did not believe that all sprains were really sprain-fractures. He had seen in experimental work on the shoulder-joint of cadavers the tearing of the ligament from the glenoid margin and from the humeral attachment without associated fracture. He had on the cadaver repeatedly produced sprains of the ankle by fixing the foot in the vice and pulling the leg over, every time getting a sprain-fracture. Now, he had been doing some work on dislocations of the shoulder and at the bottom of this work is the idea of sprain and sprain-fracture, a dislocation being nothing more than an exaggerated sprain. He believed that the condition described by Codman as due to a sub-acromial bursitis is the result of sprain-fracture, at the shoulder-joint. Forced abduction is to the shoulder what a lateral turn of the foot is to the ankle, and what forced dorsal flexion from a fall on the hand is to the wrist. The effect of forced abduction on the shoulder is to tear the ligamentous attachment on the axillary side. Rather frequently a tearing off of a small portion of the internal glenoid margin will be produced. He had often found roughness of the glenoid margin. He had found similar fractures reported in the literature. Far more important, and not recognized as such, is a tearing fracture at the shoulder of the greater tuberosity. As abduction is forced it tears the axillary portion of the capsule, and if abduction is continued, as the humerus strikes the edge of the acromion the head is violently forced out and the external rotators with the underlying portion of the capsule pulling back on it give way. This is an extremely important accident, and occurs more frequently than is credited. If one tears off the greater tuberosity with the underlying capsule,

or if the capsule alone is torn from the greater tuberosity and these edges become separated, when the dislocation is reduced the head of the humerus drops and this is always associated with severe paralysis of the upper extremity that never completely recovers. He had found that condition associated with a fracture of the greater tuberosity as shown by the X-ray and as shown in the operations by irregularities of the tuberosity. This idea of fracture of the greater tuberosity from forced abduction is in line with the views of the reader of the paper.

In line with the thought that forcible abduction is an important movement, practically all of the dislocations of the shoulder in the adult are anterior dislocations, and the reason is because they are due to forced abduction which is very common and can produce only an anterior dislocation. As the head goes out and the pull comes on the supraspinatus, the infraspinatus, the teres minor and corresponding portion of the capsule, the capsule may tear, the greater tuberosity may tear off, and the subacromial bursa, which lies on and is intimately adherent to the greater tuberosity and tendons attached to it, must be involved in the inflammation, this is the reason why Codman and others have found adhesions in the bursa. Codman has recently reported two cases in which he sutured the two ends of the torn supraspinatus, and he has very much limited the causative factors in subacromial bursitis. He now believes subacromial bursitis is usually due to tearing of the supraspinatus tendon, and this again is frequently replaced by a tearing of the greater tuberosity, so that inflammation in the bursa should be common. Its importance, however, is secondary to the laceration of the axillary portion of the capsule, which is necessary to the mechanism of the tearing of the tendon or the tuberosity. Wherever there is a fracture of the greater tuberosity of the humerus there has been a dislocation of the shoulder, and in those cases in which there is no history of a dislocation, the latter did occur at the moment of forced abduction, but was spontaneously reduced as the arm fell to the side of the body immediately afterward.

DR. G. G. DAVIS was under the impression that the reader in his experiments stated that whenever the tendon was pulled until something gave way, that it was the bone which yielded. That such is not always the case in man is shown by the many cases of rupture of the quadriceps, and the biceps tendons, but it raises

the question as to whether or not some of these conditions may not be examples of sprain-fractures. We can account for others by disease of the tendon; he had a preparation which shows the long tendon of the biceps very markedly diseased by osteoarthritis, which caused its rupture at its exit from the capsule.

DR. JOHN H. JOPSON said that the truth as brought out in these cases lies in a middle ground rather than on the plane which the essayist would have us believe, in other words between his position on the one hand and Dr. Ashhurst's on the other. The essayist says that his cases were not attended by laceration of the ligaments of the joint and were therefore not sprains according to Ashhurst. That all sprains and dislocations are attended by fractures of bones he did not think the majority believed. All have operated on cases in which ligaments or tendons have been torn from bones without fracture of the bone, as in rupture of the long head of the biceps, where it has been torn from its point of origin, and in rupture of the quadriceps tendon so-called where the tendon is torn away from its attachment to the bone, probably as often as its separate fibres are torn through. On the other hand fractures frequently accompany both sprains and dislocations. He had operated on a case of dislocation of the shoulder attended by fracture of the anatomical neck of the humerus in which the anterior lip of the glenoid cavity was torn off.

DR. GEORGE G. ROSS rejoined that the point they made is that it is the periosteum and the bone to which the ligament is attached that gives way and not the white fibrous tissue. They believed these so-called sprains are fractures of a minor degree. With regard to the quadriceps extensor above the patella he had seen one case of complete tear of the ligamentum patellæ without fracture. The patient was a colored man of 80 and his tendons and ligaments were all in a state of senile pathology that predisposed toward tearing. He did not deny the fact that he had seen a tear of the tendon of the quadriceps extensors, but the vast majority near the joints are sprain-fractures, and he believed this to be the true pathology of sprains.

DR. WILLIS F. MANGES agreed with the essayist that the occurrence of sprain-fracture is far more common than has heretofore been appreciated. He found this out by his X-ray work. It is surprising how small a fragment of bone can sometimes be clearly

demonstrated. On the shoulder-joint particularly, where the condition is sometimes called a subdeltoid or subacromial bursitis, he had often taken the view that we are dealing with a sprain-fracture to which little attention was paid at the time of injury, and there has ensued an inflammation which remains more or less chronic until a subsequent wrench produces violent pain in that region. On the other hand, he believed that there are quite severe sprains or injuries around the joints where there is certainly no demonstrable portion of bone torn from the bone. Whether or not the ligament itself tears, or its attachment tears without fracturing the bone, he could not say. He did know, however, that the sprain-fracture is not uncommon.

DR. ASTLEY P. C. ASHHURST added that he recognized a fracture, a sprain, and a "sprain-fracture," but to call all these injuries, which have heretofore been called sprains, sprain-fractures, he thought would only serve to add confusion to what already is sufficiently clear. As to the possibility of ligaments being torn elsewhere than at their insertions, in the patient he showed earlier in the evening he found that the external lateral ligament of the ankle-joint had been torn through the centre; there was no fracture of the fibula or calcaneum which he could see. The rupture had taken place through the body of the external lateral ligament and he sewed it up again.

DR. MORRIS BOOTH MILLER said that a distinction should be made between a sprain which involves solely the ligaments and a strain which is an injury to tendons, fascia, or muscles. A look at the specimens presented by the essayist shows that they represent shells of bone pulled off by tendons and hence are examples of fracture strains and not fracture sprains.

DR. G. G. DAVIS added that in making artificial luxations on the cadaver sometimes are found shells of bone sticking to the band-like ligaments, but at other times the bony edges are not broken. As to the question of relative frequency, and to solve this question, more careful radiographic observations must be made.

DR. LEVER F. STEWART (in closing) said that in these experiments, which, by the way, were done on living dogs, it was found that the sprain-fractures were sometimes so infinitesimal that they could not see but could only palpate the fragments. It is quite reasonable to suppose that in these cases the X-ray cannot demon-

strate such small lesions. He referred to what had formerly been called severe sprains as sprain-fractures, and suggested that similar cases with symptoms of less severity were better called strain than sprain, providing, of course, that sprain-fracture is not demonstrated in them.

FRACTURE OF THE FLOOR OF THE ACETABULUM.

DR. PENN GASKELL SKILLERN, JR., and DR. HENRY K. PANCOAST presented a paper with the above title, for which see page 92.

DR. ASTLEY P. C. ASHHURST said that in a recent paper on this subject by Henschen, in which 139 cases were collected, it was said that no attempt should be made to reduce the intrapelvic spicules of bone until the femoral head had been withdrawn from the pelvis; Henschen advised that the thigh be dressed in flexion and adduction in a plaster case, and that the patient should bear no weight on the limb for two or three months.

TRANSACTIONS
(IN PART)
OF THE
GERMAN SURGICAL SOCIETY*

Fortieth Congress held April 19-22, 1911.

GENERAL SURGERY, PATHOLOGY, AND THERAPY.

I. DISINFECTION OF THE HANDS AND SITE OF OPERATION.

DR. H. KÜTTNER (Breslau) reports researches made since the 27th Surgical Congress (1898), when V. Mikulicz made his important report. Answers by 210 German, Austrian, and Swiss surgeons had been obtained to a series of practical questions covering: what means to guard against, what to adopt, and what on account of ill results to abandon; and these formed the basis of Küttner's report.

After the exact investigations of Paul, Krönig, Sarwey, Gottstein, and Haegler had proved without doubt that none of the existing methods was able to render both hands and skin bacteria free, efforts were made to the following ends: (1) To obtain an antiseptic that would answer the purpose. (2) To ascertain whether or not mechanical means would be superior to chemical means. As it is impossible to destroy the bacteria perhaps they could be so fixed to the skin that they would stick fast to it, and not be loosened, thus not getting into the wound. (3) To prevent direct handling of the wound by using impervious materials.

I. *New, Practical Antiseptics.*—The mercury preparations, practically, as well as the formalin derivatives, did not prove powerful enough to kill organisms. The newer phenol preparations were apparently better. Bechold and Ehrlich have shown that the halogen derivatives of phenol possess almost inconceivable antiseptic properties. Laubenheimer demonstrated that a 2 per

* Translated from the *Beilage zum Zentralblatt für Chirurgie*, No. 29, 1911, by OSWALD JOERG, M.D., MAX LEDERER, M.D., and JAMES TAFT PILCHER, M.D.

cent. lysol solution in mercury bichloride, 1 per cent., has at least the power to destroy the pyogenic organisms; while the value of the bichloride alone—one might say exaggerated value—depends on the almost specific effect of this chemical upon certain spores used in earlier investigations. Laubenheimer found that the antiseptic property of chlormetakresol is not diminished in egg albumin, that it is not toxic, and that it is not very soluble in alcohol. With this substance the hands were rendered germ free in about 8 minutes. Likewise Bechold and Ehrlich have succeeded in destroying the *Bacillus coli communis* within 8 minutes, using a 1 per cent. solution of tritetrabromnaphthol; a control of 1 per cent. phenol requiring 60 minutes for the same purpose. Küttner brings these results forward with the hope that operators will find them as successful. Chlormetakresol is being used by two operators; one is pleased with it, while the other finds it causes severe itching of the skin.

2. *Mechanical Disinfection.*—By thorough mechanical cleansing of the skin, undoubtedly much of the superficial uncleanness is removed, and at the same time many of the bacteria from the deeper layers of the skin are brought to the surface. Various objections against the Vogel hot-air apparatus for sterilization of the field of operation render it useless for practical purposes. Of the latest means recommended, alcohol gives at least as good results as do the older methods, especially that of Fürbinger. Ideal sterilization is not effected by the use of alcohol, but the advantages of the method are, that alcohol is always at hand, and the small amount of time necessary in washing. For these reasons it is the method of election in emergencies except in the operating room, and in the field. Setter's chiralpaste, of which much was expected because of its easy transportation, after trial by the Prussian War Department has been replaced by strong alcohol. In ordinary operative work, there is no risk attached to the use of alcohol provided the nails are thoroughly cleaned; however, those who do not have faith in this method may use with it hot water alcohol disinfection, of the Fürbinger method, although alcohol alone answers the same purpose.

The iodine-benzene method of Heusner has been varied many times for the reason that the pure mixture irritates the skin, so that to obviate the latter objection paraffin oil has been added and now the Heusner solution consists of iodine 0.5, benzene

800, and paraffin oil ad. 1000. The dilution of the iodine does not diminish its antiseptic properties; yet there is less irritation. Further, Heusner advocates immersion of the hands in concentrated alcohol for a short time in order to remove the brown color and prevent the slipperiness due to the paraffin. The field of operation should be sprayed with iodine collodium. Brüner and others report good clinical and bacteriological results after using this method, while Enderlein, on the contrary, finds it interferes with early wound healing. In order to offset the danger of benzene explosions, Grassman suggests the use of benzoformtetrachlorcarbon. Heusner states, however, that the latter substance is a strong skin irritant.

Von Herff and Kolle have obtained excellent results with tetrachlorethylene. Wallace recommends the use of dichlorethylene.

3. *Isolation of the Operative Field by Means of Impervious Materials.*—Rubber sheets were at first fastened to the incision surface, and the surrounding of the operative field after Murphy with rubber dam was attempted in this work. The experiment of Weil of pasting thin rubber sheets over the site of incision with iodine glue solution is noteworthy. Further experiments with Menge's disinfection of the hands with paraffin xylol, with Murphy's acetone-guttapercha, and with Schliech's wax were tried. These methods have as few followers as have the hand varnish of Lesai and Kossman's chirol. Haegler opposes these methods because of the permeability of the coverings over the irregularities of the skin. In addition to the above, the following methods have been described since 1906: Doederlein's guandin, Wederhake's rubber skin, Dornitz and Klarpp's chirostes, Heusner's iodine collodium, Von Herffe's benzodamar, and V. Oettinger's mastisol. All of these materials have but few followers, except perhaps mastisol.

Upon a high pedestal stands the incomparable rubber glove, which, although not in so general use in aseptic work, is worn by all operators during septic operations. For the protection of the hands, in handling septic material, in dressing septic cases, and at the same time in not interfering with the healing processes, the use of the rubber glove cannot receive enough praise.

While the rubber glove is on a solid foundation as regards its use, the protection of the field of operation by sheet rubber

has a better substitute in the use of tincture of iodine as recommended by Grossish, and this is the most important acquisition to the subject up to the present time, according to Küttner. Of course the use of tincture of iodine as an antiseptic in surgery dates back for a long time; Liebig having known of its surgical properties, and Pirogoff and Lücke having tested its germicidal powers. The original Grossish method consists in painting the field of operation twice with the tincture, regardless of other preparations.

The Grossish method has certainly lived up to expectations; 187 out of the 210 operators have used this method, and 89 have adopted it as their routine in all operative cases. The only objection to iodine for this purpose is the occasional production of an eczema which can be prevented by observing the following rules:

1. One can use a 5 per cent. instead of a 10 per cent. tincture (the ordinary strength). Küttner in 1400 operations found it gave the same satisfaction.

2. Frequently renewing the solution, as in old solutions iodine water forms, this being responsible for the eczema. Or the field of operation can be washed with alcohol, and then sprayed with the tincture, thus using nascent iodine *in situ*.

3. One hundred and thirteen of the 187 surgeons preceded the iodine treatment of the skin by other means, and of these 28 per cent. complained of the eczema, while of the remainder, who used the tincture without previous sterilization, only 8 per cent. noted the skin irritation.

The other details of the Grossish method are of little significance. The unanimous opinion of the operators of the advantages of this method are summed up by Müller as follows: (a) the benefits gained are out of proportion to the risks attached to its use; (b) it is applied in a few seconds; (c) it acts in a few moments; (d) it can be used in any operative procedure; (e) its action is absolutely positive; (f) the technic is so simple that any lay person can apply it; (g) it is not barbarous.

Küttner recommends the following technic: The evening before operation the patient is given a full bath, and the field of operation is shaved, no other especial attention being paid to it. New night- and bed-clothes are supplied. No dressing is applied to the shaved area. When the anaesthesia is started, one coat of 5 per cent. tincture of iodine is painted over the field of operation

and a sterile dressing is applied. Just before the incision is made another painting of 5 per cent. tincture is made. In emergency operations the field is dry shaved and a painting of 5 per cent. tincture is made, this being repeated just before the operation is begun.

Küttner then sums up with the statement that the prevention of post-operative infection can be best accomplished by the use of tincture of iodine, alcohol, and rubber gloves.

II. INTRAVENOUS HEDONAL ANÆSTHESIA.

DR. S. P. FEDEROFF (St. Petersburg) submits the statistics of three Russian surgical clinics, namely those of Prof. Opel, Dr. Poljenow, and himself. Of 580 cases of hedonal intravenous narcosis, there was no fatality traceable to hedonal directly. Only in 8 cases was there respiratory failure with cyanosis, where artificial respiration was necessary. Lately, the author has had no such case, since he has regulated the flow of the infusion to 50-60 c.c. per minute. In no case was the cyanosis so deep as with chloroform.

The pulse becomes more rapid when the infusion is begun, but the quality is unimpaired. The blood-pressure is not changed. With hedonal one can obtain the deepest kind of anæsthesia.

The author recommends this method in nerve, gall-stone operations, in operative procedures about the head and neck, for, in these instances, it is better than inhalation anæsthesia. It is also indicated in cachectic and anæmic conditions.

III. INTRAVENOUS ETHER ANÆSTHESIA.

DR. H. KÜMMEL (Hamburg) reports upon 90 cases of intravenous ether anæsthesia. The cases were selected with great care, and the nervous and circulatory systems and blood were examined thoroughly. This method can never replace scopolamine-morphine, ether, or chloroform, but he is convinced from a study of his results that in certain groups of conditions the intravenous method is invaluable.

The most important indications for the administration of the anæsthetic in the above-mentioned way is in operations about the face and head, especially of the mouth, trachea, upper jaw, base of the skull (hypophysis tumors), as well as of the neck. In these instances, the anæsthetist is out of the operator's way, and

no mask is placed on the operative field. The quiet and equal anæsthesia, the freedom of the operative field, and the replacement of the blood lost by hemorrhage during the operation, by means of the salt solution, in which the ether is contained, are the greatest advantages of this method.

In nine cases of tumor of the upper jaw, larynx, thyroid gland, scalp, and base of the skull, in operations on tumors of the hypophysis and carcinoma of the tongue, as well as in rhinoplasty, it was surprisingly easy work because of the quiet anæsthesia and the uninterrupted field of operation.

There were also debilitated subjects, who through long illness were markedly emaciated and ill nourished, in whom a salt infusion was necessary before operation. Such patients under intravenous anæsthesia showed a marked improvement in the pulse and heart action, usually leaving the operating room in better condition than when they came into it. Return to consciousness is rapid; nausea and vomiting do not occur immediately after operation, and have not been noted, except in serious laparotomies, where, of course, it cannot be entirely prevented. The small amount of ether used accounts for the relative well-being of the patient following the anæsthetic. It acted in this way in 7 cases of cancer of the œsophagus and cardia, in 21 malignant tumors of the stomach, in 7 benign tumors of the pylorus, in 2 rectal and cæcal cancers, in 5 hysterectomies for carcinoma, in operations for extra-uterine pregnancies, and other benign and malignant tumors of the abdomen, in nephritics, in those with general peritonitis, and in patients with diseases of the joints and with bone tumors.

As several of the patients with cancer ended their sufferings sooner or later after operation, it was possible to control the clinical observations by means of histological examinations in 21 cases. The lungs, heart and kidneys showed no changes due to the narcosis, while in 11 cases there was a thrombus at the site of infusion. In those cases where Burkhardt's technic was followed to the letter with the interrupted instead of the continuous stream of infusion, were found large thrombi occluding the lumen of the vein. In later cases, no larger thrombus than after an ordinary salt infusion was noted.

In a later group of 50 cases, 10 controls were examined and in not one of these was a thrombus demonstrated. This he be-

lieves is due to an improvement in technic devised by Dr. Schmitz-Pfeiffer.

The danger of thrombus formation at the site of infusion, Dr. Kümmel thinks, is exaggerated. Since the universal use of salt solution as a vehicle for intravenous medication, although local thrombi form, pulmonary emboli never occur, an embolus from the upper extremity being rare. However, should thrombus formation be diminished or prevented entirely, it frees the method from any danger whatever.

Regarding the technic of the intravenous administration of the ether, all patients under 60 years of age receive 0.5 milligramme of scopolamine and 1 centigramme of morphine preceding narcosis. While unconscious, on the operating table, the eyes of the patient are covered, and under strict asepsis the median vein is exposed and a canula is introduced as in doing an ordinary saline intravenous infusion. In order to obviate thrombus formation, an attempt was made to preserve a continuous flow of fluid, while adding the ether mixture, in contradistinction to Burkhardt, who interrupts his stream, thus causing a thrombus to form. Taking advantage of the experiments of Schmitz-Pfeiffer, Dr. Kümmel attempted to attain his end by using two graduated glass tanks, one with physiologic salt solution, the other containing the other salt solution mixture. Two rubber tubes from these tanks connected with a Y-tube, to the simple arm of which was attached a third rubber tube and the canula, with a regulating mechanism controlling the primary tubes. By means of the latter adjustment an equal, easily regulated flow can be maintained. For example, should the narcosis be too deep, the flow from the ether mixture tank can be stopped, until the reflexes reappear, when it is again permitted to flow as indicated. Likewise, the salt solution supply can be regulated as necessary.

With this apparatus a permanent stream can be maintained, the amount of fluid injected can be noted at a glance, and the rate of flow easily regulated.

At the most after 10 minutes, or in very weak patients after 4 or 5 minutes, with an injection of 100-200 Gm. of fluid, equivalent to 4-5 Gm. of ether, the operation may be started. The rule is, that although one may get slight movements on the part of the patient at this time, they do not interfere with the operation.

During the early attempts, before the advent of the continuous stream, two cases of cyanosis and one of asphyxia were met with, the latter demanding artificial respiration. Perhaps these patients received too much ether, thus causing the undesirable complication. The cyanosis disappeared after the ether flow ceased.

The remaining anæsthesias were quiet, with regular respirations and pulse of good quality. No complications except the above-mentioned were noted.

The anæsthesia of longest duration was in an emaciated individual on whom a resection of 10 cm. of œsophagus and part of the stomach was done for carcinoma of the cardia. During a period of 145 minutes he received 1700 Gm. of ether mixture, containing 85 Gm. of ether. It is believed the survival of this patient was due to the method of narcosis. In another patient where a primary operation on the skull was done for a tumor of the base, 900 c.c. of ether mixture was administered with 45 Gm. of ether, over a period of 105 minutes.

The cases of intravenous ether anæsthesia did so well that the use of isopral and hedonal, with which Burkhardt and Federoff have obtained such good results, has been discarded.

Intravenous ether anæsthesia according to Dr. Kümmell's experiences is a form of narcosis indicated, in a certain group of cases, that at the present time cannot be duplicated. He would use this method as the ideal anæsthetic in many operations.

IV. LOCAL ANÆSTHESIA IN OPERATIONS ON THE TRIGEMINUS.

DR. H. BRAUN (Zwickan) reports his experiences in interrupting the conductivity of the fifth nerve. This is accomplished by injecting a 1 per cent. solution of novocaine-suprarenin. The first division is reached by deep injection through the orbit, the second by introducing the needle into the pterygopalatine fossa. The most simple way to reach the third division is at the junction of the lingual and inferior dental nerves, as described by the author in his Handbuch. In addition, the external site of operation must also be anæsthetized, for example in resection of the upper jaw the line of incision must be injected. For this purpose an 0.5 per cent. solution is used. Under local anæsthesia the following operations were done: 13 radical operations for frontal sinus disease; removal of the nasal bones for carcinoma; removal of nasal fibromata with flapping over of the superior

maxilla by Kocher's method; 8 resections of the upper jaw, 12 removals of the tongue for cancer; removal of the floor of the mouth and tonsils, some with preliminary splitting of the inferior maxilla. In the main operations thorough removal of the lymph-nodes was also successfully accomplished under local anæsthesia.

The advantages for this method apparently are in this location of the body rather than in other parts. Not only is complete anæsthesia obtained, but the field of operation is practically bloodless. For resection of the superior maxilla, ligature of the carotid, as recommended by Kuhn, is unnecessary, as there is no bleeding. Lung complications are rare. For resection of the inferior maxilla and for operations on carcinoma of the mouth and nose, this statement also holds true.

V. FREE TRANSPLANTATIONS.

DR. LEXER (Jena) reports that for forty years, since Reverdin's report, German surgeons have attempted to successfully transplant tissues. Epidermis unites well, as is well known, in skin grafting; mucous membrane not so well, as in defects; and certain tissues within the body not at all, as in dural defects. Skin flaps with or without fat, regardless of size or shape, can be easily transplanted anywhere. Only within the body, such tissues as the peritoneum, pleura, or synovial membranes will not unite. The blood supply is the important factor. The best way is to allow the part to bleed until clots form, and the donated tissue is pressed on these, the fibrin acting as a fastening substance. Heteroplasty is not practical. Regarding homoplasty, the reports in the literature vary. Lexer's conclusion is that only a transitory result is obtained by the use of fetal tissue in transplantation. Foreign epidermis or skin flaps either become gangrenous or apparently take, only to be discarded in three weeks by suppuration and granulation. The scar is like one after crust healing, even when the foreign tissue is cast off without pus formation. Finally, the apparently healed epidermis desquamates and is replaced by a scar. The epidermis grafts of a fœtus apparently attach and heal, only to disappear later.

Racial differences were also observed. While the grafts in like races healed with scar formation, those of different races desquamated with pus production. Homoplastic transplantation in blood relatives was not attended with brilliant results.

Homoplastic transplantation of mucous membrane was not

successful; while in grafting mucous membrane of the one individual (autoplasty) infection occurred. Transplantation of the appendix to the urethra for defects of the latter was attended with excellent results when the peritoneum of the former was first removed. Attempts to replace portions of the œsophagus with resected intestine were unsuccessful.

Fat transplantation in autoplasty has been attended with good results, to prevent adhesions between the dura and the cranium, to fill out sunken defects on the face, about the joints and breast, to fill out the orbits, and in the repair of nerves and tendons.

Muscle and nerve autoplasty give poor results. Future investigations may reveal some advantage to be gained by nerve autoplasty in hastening nerve regeneration.

Blood-vessel transplantation has been made possible by the blood-vessel suture. The earliest attempt in man was reported by Lexer four years ago. In this case a portion of the saphenous vein was inserted for an arterial defect; the result is still good. Homoplasty of blood-vessels, it is true, is attended with good results, but only by substituting vessels from the same locality; yet it does not give the same success as does autoplasty, because of thrombus formation. Apart from repairing the circulatory apparatus, blood-vessels can be employed to repair defects of the urethra. Attempts to use them in plastic operations on the ureters were not successful because of the constant flow of urine. For nerve injury, autoplasty does very well, by using the vein, but not as well in tendons.

Fascia and periosteum transplantation has not been successful.

In general transplantation of tendons the success depends entirely upon early exercise. With complete immobilization adhesive bands form. With early motion the bands do not form, and the functional stimulus aids in the regeneration of the weakened tissues. On this ground, the repair of tendons and tendon defects is possible, for example, after suppurative destruction of the tendons of the fingers. In these cases small incisions are made under the skin and portions of the palmaris longus tendon from the same patient are transplanted. Homoplastic transplantations of not too thick tendons are just as feasible. These methods are established clinically and experimentally.

Peritoneum in the form of hernial sacs and hydrocele membrane has been employed to repair dural defects, with ill results,

as thickening and adhesions occurred. Normal peritoneum and omentum acted in a like manner.

General bone transplantation has given brilliant results, especially when the specimen was obtained with great care from freshly amputated limbs and from the corpse. The cartilage with the bone retains its vitality without showing any changes in its growth experimentally.

Homoplastic transplantation of cartilage alone to repair sunken defects of the face or for insertion between joint surfaces, as well as the transfer of ear muscles and joint cartilage, is possible.

The transplantation of joints *en masse* from amputated limbs or from the cadaver gives good results. In so-called half joint transplantation, *i.e.*, when one articular surface of a joint with the muscles and tendon is transplanted, one can attain good function. In complete joint transplantation, Lexer reports a splendid outcome in a case operated three and a half years ago, but one must be careful of the material used, as atrophy of all the tissues is apt to occur. In another case a knee-joint obtained 8 hours after death was transplanted, and 5 months later the wound was absolutely healed.

The outlook in transplantation of entire extremities is not very favorable, as, though technically the method is practicable, one has ischæmic muscle contractions to contend with.

In visceral transplantation, the consideration is purely one of homoplasty. The outlook is poor. Clinically, the ductless glands seem to give some results, but their gradual disappearance through resorption is the rule, experimentally. To transplant entire organs with their vessels, unfortunately can only be accomplished by autoplasty. In homoplasty of viscera it is a question of nutrition, and possibly a biochemical difference of cell proteid and serum that prohibits success.

VI. EXPERIMENTAL INVESTIGATIONS IN BRIDGING DEFECTS OF ORGANS LINED WITH MUCOUS MEMBRANE.

F. HEHMEIER (Greifswald) reported experiments done on dogs to repair defects of the trachea by means of foreign fascial flaps. Large and small defects of the anterior wall of the trachea were recovered with fascial flaps obtained from the sternocleidomastoid and anterior rectus muscle sheaths. The borders of the flaps were placed upon uninjured tracheal tissue, then fastened at

the four corners to the trachea, and sewed to it by a continuous suture. For further stability their borders were sewed to the perichondrium and cartilage. The flaps then lay in place smoothly. The muscles and skin of the neck were united and drainage was not instituted. In two cases healing with perfect union was noted on from the eighth to the tenth days. In young dogs, with tracheæ the consistence of those of children, the lumina of the tracheæ were not contracted. In 8 out of 9 cases the result was brilliant. Two of the dogs coughed for several days, severe pulmonary complications did not occur, and skin emphysema was not observed. The dogs were killed after 2, 3, 6 and 12 days. In three cases there were adhesions of the flap to the subcutaneous tissues. The flaps in the remaining cases were free and not contracted, the surfaces bridging the defect being very smooth; blood-vessels entering the new tissue from the perichondrium could be plainly observed. On the inner surface, in three cases there were small granulations, while the rest were covered with mucous membrane. Microscopical examination showed that the nutrition of the flaps was derived mainly from the perichondrium. The epithelial lining was somewhat flatter than the normal.

Defects of the urinary bladder were treated by transplanting fascia of the anterior sheath of the rectus muscle or portions of the fascia lata. The bladder was exposed by a laparotomy and areas of varying size from a quarter to one dollar were covered; in one case the anterior wall was entirely replaced. The defects were covered with either single or double layers of fascia, and a double layer of sutures was inserted. The bladder was returned to the abdominal cavity and the wound was closed. In four out of five cases the outcome was very satisfactory.

Whether larger bladder defects can be remedied in this way is a subject for further study; but tracheoplasty, from the results obtained in animal experimentation, is worth while trying in man.

HEAD, NECK, AND THORAX.

I. ON THE PROPHYLAXIS OF POST-OPERATIVE MENINGITIS.

H. LEISCHNER and W. DENK (Vienna) reported a series of investigations in which the bactericidal property of urotropin in preventing infection after brain operations was tested. It is well known that urotropin in ordinary dosage appears in the

cerebrospinal fluid as formaldehyde in small quantities. The above authors wished to ascertain whether urotropin really appears in the cerebrospinal fluid, in what concentration and what types of infection it is able to overcome.

After administration of 2-8 Gm. of urotropin per os, within a few days Dr. Jantsch demonstrated 0.004-0.02 per cent. of free formalin in the cerebrospinal fluid. Experiments were then undertaken with solutions of varying strengths of formalin (including the above percentages), and it was found that their germicidal powers were relatively weak, as even dilute emulsions of bacteria when acted upon still remained alive.

They conclude that in mild infections this drug may be of some aid, but in the severe types it is utterly useless.

II. FURTHER EXPERIENCES IN PUNCTURE OF THE CORPUS CALLOSUM.

VON BRAMANN (Halle a. Saale) reported as follows: The technic of the puncture of the corpus callosum is the same as that described by the author two years ago, except that the operation is done in adults and in children who do not get a general narcosis, under local anæsthesia by means of novocaine and adrenalin. The injections into the soft parts and under the periosteum render these tissues, as well as the bone and dura, anæsthetic. An incision 3 cm. in length, about the width of the index-finger, behind the coronal in the midline divides the soft parts down to the bone. After reflecting the periosteum, the skull is trephined about 1.5 cm. from the midline, an opening 1.5 by 1 cm. being made, and the dura is exposed. The latter is then incised (for 2-3 mm.) in a location free from veins, and a silver canula is carefully introduced between the dura and pia mater until the falx cerebri is reached. The diameter of the instrument should be about 2-3 mm. The course of the canula is carefully directed to the corpus callosum, moving it from side to side, in order to avoid the distended sinuses and veins. The corpus is then cautiously punctured and after a fair amount of fluid (15-20 Gm.) escapes, the opening is gradually enlarged by moving the canula to and fro. The tube is now removed, the dura and soft parts are sutured.

Certain complications were met with because of processes of

sinus and also because of the dilatation of veins due to the increased intracranial pressure. In some of these cases, packing of the wound was necessary for several days. No large vessels were encountered in the deeper parts of the brain. In 51 cases there was no fatality. Operated upon were 27 tumors of the brain, 18 cases of hydrocephalus, and 6 epileptics. In the first group of cases, the general tumor symptoms—headache, vertigo and vomiting—disappeared or became less severe. The first symptom to vanish in many cases was the choked disc. In less than one-half, no change in the eye grounds was observed. However, the tumors in the latter cases were situated in the large basal ganglia, where compression of the blood-vessels was very great.

Two of the hydrocephalus cases were entirely cured. In some instances the tumor could be located by means of the canula, as when situated in the wall of the ventricle.

The author recommends puncture of the corpus callosum in all cases of hydrocephalus in children and in all cases of acute hydrocephalus in adults, as their symptoms are always relieved. The former are always favorably influenced, the choked disc in half the cases being relieved, and in the remainder permanently cured.

The operation is indicated in all cases of brain disease where there is congestion of the optic vessels and blindness is present.

III. BASEDOW'S DISEASE.

PROF. DR. THEODORE KOCHER (Bern) after analyzing 721 operations on the thyroid gland, in 535 patients, concludes that as a result of the histological changes which have been noticed, there has developed an over-secretion in which the iodine content is much increased. The symptom complex of Basedow's disease can be produced in animals through the injection of the secretion of the gland, the gland substance itself, or iodothyroidine, from which experiments the conclusions were made that the disease was the resultant of a hyperactivity of the thyroid. In confirmation of this conclusion it is stated that as a rule the exhibition of iodine therapy in these cases usually causes an intensification of the condition. Further research disclosed the fact that a leucopænia exists in this class of patients, with a relative increase in the

mononuclear cells, and further that the processes of assimilation were markedly diminished.

The clinical picture presents at times a predominance of symptoms involving the sympathetic system, at others, those more relevant to the vagus. Thus one is evidenced by the exophthalmos, tachycardia, or glycosuria, in the other class disturbance of the alimentary tract takes precedence.

Of etiological import, spells of temper, iodine therapy in diseases of the thyroid, infectious diseases, and hypersecretion of the generative organs seem to precede the onset in the majority of cases.

If the disease is due to a hyperactivity of the thyroid, the aim must be to diminish by operative removal the amount of the gland which is secreting. This has been accomplished by the author, and he has established the fact that the degree to which health may be restored is proportional to the amount of gland removed. In his own experience the operation has been found to be accompanied with very little danger, 3.1 per cent. mortality in 535 patients, and he concludes therefore that the disease should be surgically treated, and operative intervention should be undertaken at the earliest possible moment.

IV. EXPERIMENTAL RESEARCH IN BASEDOW'S DISEASE.

HEINRICH KLOSE (Frankfort am Main) endeavored to determine whether the disease of the thyroid gland described by Basedow was due to a hyper- or a hypo-activity of the parenchyma. The work was done at the Institute for Experimental Surgery in Frankfort am Main.

It was demonstrated in dogs that subsequent to an injection of a freshly prepared extract from the gland of a patient with Basedow's disease, a typical picture of this condition was reproduced. The dogs even after small amounts of injected material developed fever and irregular pulse, panting respiration, chills, sweating, and albumin and sugar in the urine. Very infrequently an exophthalmos was noticed.

The blood picture after a very transient diminution of the polynuclear cells developed the typical hyperthyroid lymphocytosis. The blood-pressure diminished from 200 mm.Hg. to 80 mm.Hg. After eight days at the latest the severity of the reaction had disappeared. The reaction is so delicate that it forms

an important point in the differential diagnosis between those cases in whom the clinical picture is not sharply cut and in whom it is a question as to whether one has to deal with an instance of Basedow's disease or an ordinary goitre.

If one injects a dog with a large amount of an ordinary goitre, there appears merely an atypical blood reaction, which is the result of the foreign albumin, and there follows no clinical disturbance. Klose then injected animals intravenously with potassium iodide in order to more certainly identify the nature of the toxic substances in these cases, employing 0.03 pro kilo body weight. The animals reacted identically as in the experiments where the extract of the previously diseased gland was injected. Therefore the results in the latter must have been due to the iodine content alone.

The author concludes from his experiments that: (1) Basedow's disease and the hypothetical hyperthyroidism are mere qualitative differentiations. (2) The toxic effects in Basedow's disease and iodine poisoning are probably identical. In accordance with Klose's working hypothesis there exists in cases of Basedow's disease a portion of the glands in which the specific properties are lost, namely, to secrete iodine in an organic form. It is quite possibly poured out directly as inorganic iodine or more probably deposited in some corresponding form which is easily transformed into an inorganic substance in the body. The body must withstand the continued action of inorganic iodine, which results in a symptom complex known as Basedow's disease, in which are evidenced many of the phenomena of iodine poisoning. Klose's theory is in accordance with the experiences at the bedside. Further, also, with the latest physiological researches in which iodothyroidine was administered, not as iodine proper but in a form of inorganic iodine by which an artificial Basedow's disease was established.

From these observations, Klose concludes that Basedow's disease is a dysthyreosis and not a hyperthyreosis. That the dysthyreosis results in the gland not being able to exert its inherent property to secrete iodine in the usual form of iodothyryn, but secretes an entirely distinct form, which in the present state of our knowledge may be termed "Basedow's iodine," which releases very easily an inorganic form of iodine, which acts in the same manner as an intravenous injection of inorganic iodine.

PROF. W. GARRÈ (Bonn), in discussing the two preceding papers, stated that in cases of Basedow's disease the thymus must be taken into operative consideration, as in those with very severe manifestations and in those who have died there has been found almost without exception a persistent thymus. In one severe case of Basedow's disease a thymectomy, without interfering with the thyroid at all, resulted in a marked improvement of the condition of the heart, a complete disappearance of the so-called Kocher's blood picture, and a very appreciable increase in weight. In a second case in which a partial thyroidectomy was done at the same time, a similar improvement was noted. Dr. Capelle has already published the conclusions that the hyperplastic thymus markedly increases the degree of symptoms evidenced in this class of goitres, and there seems to be no question that a selective heart toxin is elaborated by the thymus as pointed out by Klose.

The speaker in considering the differential diagnosis between thymus and thyroid as the etiologic factor, mentioned the following significant observations:

1. The blood picture described by Kocher disappears after thymectomy as well as after thyroidectomy.
2. Dr. Bayer, his assistant, had been able to produce in dogs after injection of so-called "Basedow-thymus extract," the typical blood picture as described by Kocher.
3. Subsequent to thymectomy in this class of cases, a marked absorption of the concomitantly enlarged thyroid has been observed (Capelle and Bayer).
4. Thymus implantation inhibits the onset of cachexia strumipriva (Gebele).
5. Implantation of thymus removed from a patient suffering from Basedow's disease into a dog caused the development of a Basedow's symptomatology of the severest kind.

Garrè believes that there is a class of patients suffering from this disease which must be separated from the remainder, owing to the combination of a persistent thymus with the usual goitre, which are recognizable by the exceptional severity of their symptoms.

This conclusion received further confirmation from his own clinical experience, namely in 65 operations on cases of Basedow's disease there occurred but two fatalities—both showed a persistent thymus.

In looking up the records of the end results obtained in those cases where a partial thyroidectomy was done, all of which were treated with the same therapeutic measures, he found a mortality of 10-15 per cent. (all suffering from extreme tachycardia and exophthalmos), and he believes that the explanation in these cases of their unfavorable termination may be found in the occurrence of a persistent thymus, and remarked in conclusion that further experience must be obtained before one may judge whether this class of cases should be recommended for operative interference or not.

DR. J. DOLLINGER (Budapest) said that severe cases of exophthalmos are rarely seen in Basedow's disease; but when present they are accompanied by severe headache, pain in the eyes, chemosis, swelling and ulceration of the cornea, swelling, perforation, and destruction of the bulb. Sattier cites 63 cases of which 12 ended fatally. Hoor reports two cases, one of which died after losing the sight in both eyes, and one remained alive after losing the sight of one eye. V. Poppen reports briefly a similar case. The therapy was confined to compresses and canthorrhaphy. As the exophthalmos progressed, necrosis was accelerated. In the fall of this year a man aged 63 years came into the clinic suffering with bilateral exophthalmos, chemosis, swelling of the left cornea, severe headache, and pain in the eyes. He was operated on Oct. 20, 1910. The temporal regions were exposed, part of the bone removed, the periosteum extirpated, exposing the contents of the orbit through the incision, through which the exophthalmos forced itself. It was thus dislocated laterally, and canthorrhaphy was performed. The corneal swellings, chemosis, headache, and eye pains were relieved. It is to be regretted that the muscles in the region of the temple were not united, as suppuration in the orbit may not have occurred. The skin healed *per primam*.

Dollinger saw this patient five months later. The bilateral exophthalmos was less marked, the corneal swelling of the left eye was covered with a smooth scar, the headache and eye pains had not returned.

Dollinger recommends this operation in severe exophthalmos Basedowii as soon as headaches and eye pains (severe) or chemosis appear. These cases should be relieved if possible before the advent of corneal swelling. If it is done early it can be followed by canthorrhaphy.

DR. HILDEBRAND (Berlin) called attention to the importance of a very thorough investigation of the condition of the heart, basing his remarks on a series of 100 operations undertaken by him for the relief of Basedow's disease with a 5 per cent. mortality, some of which he attributed beyond question to an insufficiency of the heart muscle after operation. In many instances the indications for operation and the prognosis were based on the condition of the heart. As an important aid to such investigation, the speaker recommended the employment of the electrocardiogram, through the use of which a satisfactory record of the condition of the musculature of the heart may be obtained before operation, and subsequent proof afforded of the improvement in its condition after operation by comparing the curves obtained.

FREIHERR V. EISELSBERG (Wien) regards operation in this class of cases as always more dangerous than in those for simple goitre, and emphasizes the point that one should not overlook the fact that a small per cent. of cases of Basedow's disease die anyhow after having suffered greatly for a long time. This is particularly true of those poor patients who are unable from social reasons to afford a requisite period of time for convalescence. The operation is particularly dangerous in cases of severe myocardial degeneration with a pulse frequency in the neighborhood of 140. A persistent thymus, which condition can be diagnosed through our present methods of investigation, is not to be regarded as a contraindication to operation. In the speaker's personal experience there were four instances in whom unmistakable evidences of a persistent thymus were present and on whom an operation was performed with very great improvement. He had had only six deaths in operating on 71 cases of Basedow's disease during the last ten years. Three of these fatalities occurred among the first six operated on, all of whom had a pulse-rate of 160 or over. In four of the cases, the existence of a thymus gland was demonstrated, one showed a very marked myocarditis, and the sixth died of pneumonia. One case suffered from apoplexy, having had a lighter attack previously. With the exception of two others on whom a hemithyroidectomy was done without any betterment of their condition, the results have been uniformly encouraging, especially as regards the suffering. The exophthalmos was not noticeably influenced.

In 59 cases half the gland was removed. In 7, both sides were resected. In 3 instances ligature alone was primarily used

and later a partial thyroidectomy done. There were no operations performed on the sympathetic system. Most of the cases were done under local anæsthesia following preliminary injection of morphine and scopolamine. Lately ether has been employed.

In conclusion the speaker said that the operation should not only be undertaken because of the pressure symptoms, but may also be performed from social reasons, since thus far the results have been so favorable. The danger while naturally present is not so real that operation may not be undertaken even in the most advanced cases, as by operation alone can the patients be relieved of their terrible suffering.

DR. KÜTTNER (Breslau), in continuing the discussion, stated that it was especially important to study the remote results of operation in cases of Basedow's disease, and not consider the immediate results so vitally, and from statistics determine which case should or should not be operated on. To determine what such statistics would show, Dr. Baruch, under the direction of the speaker, had collected the material which offered itself at the Breslau clinic during the last eighteen years.

There were 85 well-marked cases of this condition found, those lately operated having been omitted. Of these 85, 21 were treated conservatively. These occurred necessarily during the earlier years, at which time the technic of operative interference had not been developed; some, however, during the latter years in whom the conditions were especially desperate. Two of these cases died in the ambulatorium while awaiting treatment. Three others died later from cardiac failure. Of the remaining 16 non-operated cases, the speaker has been able to trace 9, in whom treatment had been instituted as long as 15 years. None of these patients has recovered health. One case only which was of mild severity seemed to have in any way improved, but is by no means well. All the remaining cases continue to suffer as previously, or have become worse. All are unable to work except the one case just mentioned.

Of the 63 upon whom various operations were performed, 11 died post-operative. These were all instances in which the disease was very far advanced, and in whom operation was undertaken as being the only possibility of saving a life otherwise surely lost. Two died from pneumonia, two from a persistent thymus, and the remaining seven because of cardiac insufficiency. In this

series of fatalities all four arteries were ligated in two. In one a bilateral resection. In the remainder, a partial thyroidectomy was done.

Of the 53 patients that survived, subsequent information has been obtained concerning 37 of them; 31 have been personally re-examined by the speaker. One patient died six years after the operation from an intercurrent illness. The remainder are still alive, the longest being eighteen years post-operative.

Of greatest interest are the 15 severe cases who were operated and in whom, beyond question, if conservative treatment had been advised, would have surely died. Of these five or one-third recovered, and to such a degree that all subjective and objective symptoms of Basedow's disease have disappeared. Eight others were so greatly improved that they were able to resume their occupations, and in only two instances of an extremely severe type was there no betterment in the condition. One of these was a resection; the other, treated by ligature of three arteries.

If we consider all the patients traced without relation to the severity of the disease we find 33.2 per cent. recovered. By that is meant that no symptoms of Basedow's disease are to be found. In other words, the patient is entirely well. Thirty-six per cent. showed a very marked improvement. By this is meant that they are able to resume their occupations, and differ from those considered entirely recovered only in the fact that there still persist some of the less important features of the disease. The third class constitutes 16.6 per cent. of the total, and represents those, who although able to work, have still some of the more serious symptoms present. These the speaker considers as merely improved. In only five patients was there no betterment in their condition. Of these two had incomplete operations.

In contradistinction to those conservatively treated, 35.7 per cent. have died, and of those still alive there has been in no instance a return to health. One only is able to work. Of those operated on, 17.3 per cent. died. Of those still living, 13.8 per cent. have not recovered health. The remaining 86.2 per cent. have either entirely recovered or are able to do their work.

This indicates that the so-called "morbus Basedowii" is a surgical disease. Its best therapy is early operation, by which the fatalities from this condition are rapidly becoming less and less.

In 24 operated cases blood analyses were made in order to establish the presence of Kocher's lymphocytosis and the regenerative processes in the blood some time after operation. The results from these investigations appear, however, to be of little value. It is interesting, however, to notice that a condition of lymphocytosis may persist in some patients who have entirely recovered from all clinical manifestations of Basedow's disease. Possibly the etiological factor in these cases may be found in the persistency of a thymus gland.

V. WOUNDS OF THE HEART.

FREDERICH HESSE (Dresden) had had the opportunity in Würzburg and Stettin of seeing ten cases of wounds of the heart operated upon; six of them had been conducted by himself.

One case, a gun-shot wound of the left ventricle, occurred in a boy of fifteen. At operation the heart was found stopped in diastole, massage was without result. Camphor injected directly into the heart musculature succeeded in re-establishing its contractions. The patient lived for seven hours after operation. The remaining five cases were stab wounds, two in the left and one in the right ventricle, and two in the left auricle, which were operated on in 1905, 1908, and 1909, and recovered. These were personally examined during March and April, 1911, and were demonstrated before the Society.

In four cases the pleura was widely opened during the operation, and in three of them the pericardial sac and pleural cavity were drained primarily, the latter being effected by means of a rib resection posterior below the apex of the scapula. In the other case the wound was closed at the time of operation without drainage. Three days later the onset of a bronchopneumonia and a beginning pleuritis necessitated resection of a rib and pleural drainage below the scapula. The four patients are pursuing their usual vocations, and have no subjective complaints. Objectively are to be noticed a decrease of the normal respiratory movement on the left side and corresponding to the point of previous infection, under the ribs and sternum anterior the pulsation of the heart is very plainly discernible, the soft parts rising and falling with each movement. In one of the cases, there is unquestionably an adhesive pericarditis which attaches the heart directly to the overlying soft parts. There has in none of them


been any change in the pulse. The border of the heart is somewhat further to the right than normal. Nothing is gained from auscultation.

In the fifth case the operation resulted in diffuse adhesions between the left lung and the parietal pleura, and also with the pleura surrounding the pericardium, which obviated the collapse of the lung or any pneumothorax. There was in this instance complete primary closure of the wound, without drainage, and a smooth, rapid convalescence. But this patient is not yet able to resume his work (two and a half years post-operative), and complains of frequent attacks of stabbing pains in the cardiac region. Objectively there is no recession, and the lung findings are the same on both sides. Between the fifth and sixth rib, however, there is a very distinct systolic murmur for a space of 4 cm. inside of the mammillary line—there was no resection of the rib done.

The following conclusions were drawn by the speaker:

1. That no delay should be counselled before operating even in those cases where one may not be sure that the heart was wounded.

2. That the administration of stimulants before termination of the operation should be omitted. Do not give morphine before the operation, but it may be administered with benefit in the after-treatment.

3. There are several methods of incision. A good one which may be easily extended and which eventually affords convenient drainage of the pericardial sac, is that described by Kocher. Rehm's  shaped incision, which forms two flaps with a lateral base, gives a good approach in those cases where a partial resection of the sternum may be necessary. In cases where the diagnosis of a wound of the heart is certain, it is advisable to approach extrapleurally, and eventually, without considering the situation of the external stitches, the hæmatothorax can be evacuated by means of a puncture.

4. Regarding the question of drainage, the writer recommends that in those operations where the pleural cavity has been widely exposed or exposed for a long time, an absorbing or capillary drain should be introduced, which should be placed at the lowest point, best to the left posterior and below the scapula. Any possible infection must be anticipated by a prophylactic drain-

age, the principles of which need careful consideration, and a wrongly placed drain may cause direful consequences. The main points pointing to the regular employment of pleural drainage are: (a) By a wide opening of the pleural cavity there is established an artificial bellows. In this operation, therefore, in contradistinction to others, we have no control over air infection and the field is continually in motion. (b) Also in the manipulation of the operative pleural wound and in the evacuation of the hæmatothorax there is necessarily a good deal of direct trauma, which predisposes almost without exception to an exudate which forms an excellent culture media for the growth of bacteria.

5. In the recovered cases there is no inconvenience suffered from the lack of a bony framework resulting from the defect in the ribs in front of the heart.

VI. DECOMPRESSION OF THE THORAX.

DR. KLAPP (Berlin) first spoke of the means of preventing the regeneration of the ribs after rib resection by the subperiosteal method. The periosteal tube is fairly safe as the new bone is concealed; but the danger is that the smooth pleura and lung may be injured. Two cases were accompanied by pleurisy with effusion and pneumonia. Instead of the thermocautery, which causes injury through heat, fuming nitrous acid may be used. A porous stick of wood is dipped into the acid, and then lightly applied to the periosteum.

In order to mobilize the thorax by rib resection, disturbance of the periosteum alone does not suffice; functional mobilization is necessary after operative mobilization. By means of the latter only, can the patient obtain benefit from his previously operatively mobilized thorax. Great stress must be laid on the after-treatment. If the thorax is neglected, there follows contraction of the chest walls due to the elasticity of the surrounding skin, to the contractile muscles and to the elasticity of the lung itself.

That one can overcome this condition after resection of the rib has been demonstrated in a case by Wilms. That the contraction follows very soon after operation was shown in a case, where, three weeks after the resection, there resulted absolute rigidity of the thorax. Because of an ankylosis of the spine and a bilateral resection of six ribs, mobilization of the thorax was impossible. In the short time of three weeks the space of 5 cm.

contracted to one of 1 cm. The cause was not due to new bone formation.

To accomplish decompression, in addition to mobilization, it is necessary not only to remove a small portion of the rib, but the whole rib or a series of ribs. Decompression operations have been rarely done, but surgery will find a fruitful field for them.

Klapp then demonstrated a patient with asthma and a very deformed rhachitic chest. This is the second such case ever operated on. In the Hirschberg case (the first reported), a regeneration of ribs took place, while in this one it did not. The result of the operation is not a total cure, but a partial amelioration of the asthmatic symptoms. Combinations of asthma and deformed thoraces are not rare. Beckart reports 180 cases.

In addition to compression of the thoracic viscera by chest deformities, the abdominal organs, as the kidneys, stomach, liver, and spleen, may be compressed.

Klapp reports some cases of decompression of the kidney on account of deformed thoraces. In one case there existed pain in the kidney due to compression by a scoliotic spine, in two cases stone in a compressed kidney, in one case albumin in the urine, which disappeared immediately after operation. Because of the difficulty in passing a ureteral catheter, it was not determined from which kidney the albumin originated, but the assumption is that it came from the compressed one.

In severe cases, where organs give symptoms of compression, Klapp recommends the possibility of treatment and a trial of decompression.

ABDOMEN.

I. TREATMENT OF INTESTINAL PARESIS BY HORMONAL.

DR. HENLE (Dortmund) said that the nature of hormonal and the method of obtaining it was described in the *Zentralblatt für Chirurgie*, 1910, No. 42. It is prepared, sterilized, and admixed with eucaine for intramuscular administration, and without the local anæsthetic for intravenous injection. The speaker, however, does not consider the addition of eucaine necessary and has omitted it in his work.

Through animal experimentation, without considering the experiences at the bedside, it has been demonstrated that hor-

monal is superior to physostigmine in its action. The physiological research showed conclusively that peristalsis was stimulated in a regular continuous manner, beginning at the duodenum and continuing to the large intestine, pushing the bowel contents before it until they were ejected from the anus. As the result of injecting physostigmine, on the other hand, there occurred merely temporary and irregular contractions, with, at times, a persistent spasm which did not tend to push the intestinal contents forward.

Henle, in further investigation with this substance, demonstrated the great benefit which occurred from its use, when given post-operative in instances of paresis which had not originated as a result of peritonitic inflammation.

In addition to a case already reported of paresis consequent to removal of a gall-stone, the speaker has employed this therapeutic agent in six other cases, in which the same conditions presented and in all of which the results of the administration of hormonal were most gratifying. In these patients thus treated there occurred in from one to five hours after the injection marked peristaltic movements within the abdomen, resulting in each instance in a rapid evacuation of flatus *per ano* and a consequent relief of the meteorismus with an immediate and permanent betterment of the general condition. One other patient suffering from a milder grade of intestinal paresis was also treated thus with favorable results.

In each instance it was necessary to give only one injection of from 15 to 20 c.c. of hormonal, in order to stimulate the peristalsis sufficiently to cause the passage of flatus. In order to stop the continuous action of the intestines, it is necessary to wash out the lower bowel with enemas and to administer appropriate medication by mouth.

In the treatment of chronic constipation, many observations have been made by internists, which would indicate that its action may continue for a long time, weeks and months in some instances. This statement does not hold true for those acute cases thus treated resulting from operative interference. If the cause of the paresis is not removed the action of the hormonal continues in its efficiency.

In many cases because of the above indicated continuance of action, it is necessary or advisable to employ other measures for

relieving the condition. In others it is necessary to repeat the injection. Thus in some instances where there is present a diffuse peritonitis which has caused an absolute paralysis, it is possible, after the administration of hormonal, to so markedly influence the bowel action that the gas and even feces themselves will be passed. Indeed in these cases it will very probably be advisable to reinject hormonal after an appropriate interval in order to bring the case to a successful conclusion. The septic process *per se* will be in no way influenced. One instance was cited in which the patient's life was obviously saved, in which the infection itself was treated by other measures.

Also in cases where adhesions are present or in order to prevent their recurrence after operation, this substance can be employed with benefit, as thereby the bowels are kept continually in motion. Further it is indicated where morphine has been administered either during or immediately after operation, or in those cases where it has been used to induce narcosis. Pantopon was suggested as an addition to the morphine injection and thus overcome the paralytic effects of the drug.

The by-effects of injecting hormonal, as a rise in temperature, chills, or a harmful influence on the general condition of the patient, are not very evident and are so evanescent that they may be disregarded and should certainly not be allowed to weigh against the administration of the preparation. One can also with an easy mind in many cases very gradually increase the dosage as indicated and thus use the preparation during a long period of time.

II. THE TECHNIC OF PYLORIC EXCLUSION.

DR. CH. GIRARD (Genf) said that gastro-enterostomy, especially as a substitute for a radical operation, is without combination with a direct pylorus exclusion, especially in cases of pyloric and duodenal ulcers, in many instances incomplete. If the experience with pylorus exclusion as performed by V. Eiselsberg is unsuccessful, the speaker recommends the employment of an easy and rapid plastic method of extramucous stenosing of the parapyloric region.

In order to accomplish this the Mikulicz-Heineke principle of pyloroplasty is reversed. The separation of the seromuscular layers is done without difficulty, and the Längs suture introduced.

In greatly exhausted patients the reader was accustomed to use a plicature of the anterior wall of the stomach or a prepyloric ligature as indicated by Körte. A few cases so treated complained for the first few days post-operative of severe pain.

Under favorable conditions in a case of callous ulcer of the fundus of the stomach, and especially those situated on the lesser curvature, Girard combines the gastro-enterostomy with an artificial median gastric stenosis,—that is to say, an artificial hour-glass stomach is made and thus the disease focus short-circuited from the alimentary canal. A favorable result may be anticipated. Two cases were mentioned to support this statement, in which such a partial exclusion of the stomach had been done by means of several plications of the anterior wall. The first was a case of a patient greatly debilitated by hemorrhage, who died from pneumonia three weeks post-operative, although the function of the stomach had been re-established. The necropsy demonstrated that the artificial stenosis had held perfectly. In the second case the result was perfect throughout.

The reader further remarked that the use of an extramucosal plastic operation, as previously indicated in exclusion of the pylorus, might be used to great advantage in such cases, but as yet he had had no opportunity to employ it.

DRS. KIRCHNER and MANGOLD (Königsberg), in discussing the foregoing paper, stated that if the vagus was either irritated or severed at any situation between the base of the skull and its perforation of the diaphragm, it occasioned various phenomena relevant to the motility of the stomach. That in doing a transverse resection of the stomach, the terminal filaments of the vagus which spread out over it are severed, and that there must follow therefore a functional disturbance of the distal segment of the organ, especially in the antrum and pyloric sphincter. This, they were able to demonstrate by animal experimentation, really did occur after such resection.

In order to accomplish this the following procedures were undertaken: The stomach was divided transversely at the middle, and either directly anastomosed again or the cut ends turned in and sutured over and a gastro-enterostomy done on the proximal segment. A fistula was established leading into the antrum and another made just beyond the pylorus, or in another series the

duodenum was cut across and the distal stump inverted, while the proximal was brought up into the abdominal wound.

If one, then, filled the pyloric antrum with water and maintained a constant pressure through the fistula, it was invariably noted that regular spurts of liquid flowed out from the duodenal fistula every 12 to 14 seconds, deducing therefrom that at these intervals the pyloric sphincter was regularly relaxed and closed, the former being judged by the appearance of the spurt from the duodenal fistula, indicating further that the pyloric antrum was performing a very definite work. Also that if a registering balloon was placed into the antrum and connected with a revolving drum, a very regular curve demonstrated the movements of the antral musculature. The pressure exerted in the antrum may rise to 45 mm.Hg.

This absolute evidence that with each contraction of the antrum there must necessarily be at the same time a relaxation of the pyloric sphincter, as evidenced by the simultaneous ejection of fluid through the duodenal fistula, is a very strong indication that the effectiveness of the movements of the stomach as far as regards the co-ordination of these two parts of the organ is in no manner disturbed.

In the normal stomach the flux into the duodenum ceases at that moment when the duodenal reaction becomes acid. This chemical reflex from the duodenum has also been demonstrated on animals by means of introducing dilute hydrochloric acid into the duodenal fistula, at which time the movements of the antrum stopped immediately and were only renewed when the reaction in the duodenum became alkaline. These observations establish the fact that the emptying of the stomach does not cease as a result of a reflex contraction of the pyloric sphincter, as has been heretofore supposed. From the preceding animal experiments the authors conclude that in dogs the pyloric sphincter and the pyloric antrum retain their efficiency after a transverse resection of the stomach—in a condition, therefore, where the vagus is separated from the sympathetic system and where the functional correlation of the cardial segment is interrupted.

Theoretically, this important observation agrees with the clinical experiences in cases where a transverse resection of the stomach has been done, as it is with great exception that any dis-

turbance of the gastric motility is noticed immediately after such operations.

DR. HAUDEK (Wien) in the discussion drew attention to the following differential points between ulcer and carcinoma:

1. Morphologically: (a) Ulcer appears under the X-ray by direct examination as a raised shadow, while medullary carcinoma appears retracted. (b) In high-lying ulcer on the lesser curvature of the stomach, it assumes a snail shape, owing to the wrinkling and diminution of its lumen, as the lesser curvature is rolled in while the attachments remain fixed. In the diffuse infiltrating carcinoma, the pylorus in the lowest point and the fundus is raised up, and the stomach appears stretched out and no longer hook shaped. (c) In hour-glass stomach with an ulcer basis, the canal joining the two sacs remains on the lesser curvature, and the aperture consists only of a small well-circumscribed spot. In hour-glass stomach with a carcinoma basis (very infrequent), the opening is frequently median and there is present a much longer canal.

2. Functional: In cases of ulcer of the stomach, it retains its contents much longer than normal, due to pylorospasm. In carcinoma not involving the pylorus, the stomach empties very quickly (pyloric insufficiency).

It is difficult to differentiate a primary carcinoma from one with an ulcer basis, and this is also true on interpreting the pictures of pyloric stenosis, whether it is due to a benign or malignant process.

III. DUODENAL ULCER.

DR. ARTHUR NEUDÖRFER (Hohenems) reported that in a series of 100 operations performed by him on the stomach, 73 cases of ulcer were found, among which were 8 instances of duodenal ulcer. This number is exactly the same as in a series of 63 cases reported by Schmitt, in which there also occurred 8 instances of duodenal ulcer. From these observations, Neudörfer deduced that patients suffering from duodenal ulcer were much more frequent in the neighborhood of Hohenems than was ordinarily appreciated, and stated further that the diagnosis might be made at the bedside in the majority of cases. Thus he had been able to diagnose this condition in all of the last five cases operated. In his experience, the symptomatology of duodenal

ulcer was a very precise one, and not easily confounded with any other disease.

There are two types: First, those in which pain was the most important symptom. In these cases it never occurs before three hours and never later than six hours after the main meal. It is noticed usually twice daily, generally about 6 P.M. and around midnight. There exists a marked periodicity of the spells of this distress, so that even months of freedom from pain ensue either in cases treated or in those untreated.

The second class includes those cases in whom there occur periodic hemorrhages, which may merely evidence themselves in fainting spells. Hæmatemesis is seldom present. There is usually no disturbance of the stomach, either in its size or function. As a rule there is a condition of hyperchlorhydria present and a point of tenderness under the centre of the right rectus muscle and above the umbilicus and a slight rigidity of this muscle.

Of particular interest in differential diagnosis is the consideration of cholecystitis, and in this connection the character of the pain must be given the position of greatest prominence. There is no curative therapy. The only relief appears to be offered by a gastro-enterostomy with a diminution of the size of the pylorus.

The speaker in conclusion emphasized the fact that duodenal ulcer should always be thought of in patients who complained of epigastric distress which recurred regularly, and stated that he believed that if a more careful examination was made, the relative frequency of this condition would be much greater.

DR. HAUDEK (Wien) in discussing Neudörfer's paper stated that in those cases in whom the diagnosis of duodenal ulcer was not absolutely evident, great aid could be obtained by an X-ray examination. He had examined eleven such cases in the course of five months and found evidences of the ulcer present. Six of these had been operated and the diagnosis confirmed. The following features were remarked: One may notice occasionally in contradistinction to pyloric ulcer that the bismuth water passes directly over into the duodenum immediately after its ingestion—that evacuation may thus spontaneously follow. That he has been able in positive cases, by thus demonstrating the position of the viscus in question, to localize the ulcer by a point of tenderness

especially on deep pressure by drawing or pushing the stomach forward. That there is usually an appreciable resistance felt which frequently occurs in instances of callous ulcer. That the time of evacuation of the stomach is only very slightly increased, so that six hours after a Reider meal, the stomach is empty or there remains only a small amount of bismuth. If the ulcer be of the penetrating variety, a picture is presented similar to that described by Nischen in infiltrating ulcers of the stomach, a persistent fleck of bismuth which is distinguishable from the rest of the duodenal contents, which does not seem to alter its position easily, and corresponds exactly with the point of tenderness elicited on pressure.

In further differentiation of this condition from pyloric ulcer in those cases presenting points of tenderness to the right of the umbilicus and distress several hours after eating, it is important and of value to consider that the localized tenderness is behind the pylorus, the difference in the time of evacuation of the stomach being relatively shorter.

It is difficult further to differentially diagnose ulcer of the duodenum from some of the forms of adhesions about the pylorus which have resulted from inflammatory processes in the gall-bladder, in which cases there may also be present a localized point of tenderness and a period of distress a few hours after eating, and in whom the time of emptying of the stomach is not at all or in no very great degree increased.

FREIHERR V. EISELSBERG (Wien) considered the diagnosis of ulcer of the duodenum is made in many instances from the regular recurrence of pain several hours after eating and from blood in the stools. It does not occur in the vicinity about Wien with such frequency as in England and America. Perhaps this may be accounted for because just the position of the pylorus and which ulcers lay on one side and which lay on the other may not have been appreciated. The position of the pylorus is marked by a circular vein (Mayo), which should be identified and used as the only absolute landmark.

Operatively considered, a gastro-enterostomy accompanied by a one-sided narrowing of the pylorus seems to give the best results. This procedure was published by the speaker in 1895. Although he first used this method, Doyen, in 1893, had also had opportunity to employ it in two cases. Resection is without

doubt the ideal method of dealing with the ulcer, as all know that it may undergo a carcinomatous degeneration. This is especially true of those situated in the very beginning of the duodenum. A simple gastrojejunostomy is undertaken alone in those cases in which the patient is in a precarious condition from hemorrhage, or in whom the ulcer may have already perforated, where a longer operation would endanger the patient's life.

The author bases his remarks on an experience of 30 cases. One was resected, nine were treated by an occlusion of the pylorus, and the remainder by a gastro-enterostomy only. With the exception of one case of pyloric exclusion, which later developed a peptic ulceration, none of the patients died following the operation.

Eiselsberg believes operation to be the only correct treatment for ulcer of the duodenum, and agrees fully with the views of Jonnesco, that if no contraindications exist, it should consist of a unilateral exclusion of the pylorus.

IV. MOBILE CÆCUM AND CHRONIC APPENDICITIS.

PROF. DR. WILMS (Heidelberg) said that the attacks of pain grouped under the terms of chronic appendicitis can be traced to the following disturbances: (1) adhesions in the neighborhood of the appendix or ascending colon, causing traction on the intestine when it is full; or (2) kinks or twists of the intestine at the caput coli or hepatic flexure, causing transient obstruction. Cæcum mobile, or the conditions termed by other writers as typhlospasm, typhloatony, or typhloectasia, has nothing whatever to do with these disturbances, these as a rule being due to the stagnation of intestinal contents over a long period of time in the cæcum. The contents may remain in the cæcum for 24 hours or more, as demonstrated conclusively by Röntgen pictures. Their consistency becomes thick, and the rest of the colon is forced to exert greater power to push these thickened contents on. The patients suffer with habitual chronic constipation. As a result of this stasis, an antiperistaltic action takes place in the colon, together with a spastic condition due to the irritation, thus causing the attacks of pain. These spastic contractions, which go together with a lengthening of the cæcum, result in traction on the movable cæcum and its mesentery, or when the appendix and its mesentery are relatively short, traction is brought on the

mesenteriolum. The pain of chronic appendicitis is thus traction pain, aggravated by slight inflammatory changes in the environment of the mesenteric nerves.

Excepting palpation (gurgling tumor), the diagnosis is positively established by means of an X-ray picture. Wilms recommends three pictures, 4, 8-10, and 24 hours after the administration of bismuth. His results with cæcopexy show that not only is the pain relieved, but that the chronic obstipation also is cured. Not less than 75 per cent. of the operated cases had after this treatment normal bowel movements, whereas formerly their bowels would move only after cathartics. In uncommonly large cæci, Wilms recommends, instead of cæcopexy, a shunting of the colon by anastomosing the small intestine lying over the cæcum to the transverse colon. Only those cases should be operated on in which the obstipation has not yielded to thorough internal treatment, *i.e.*, in severe cases accompanied by pain.

DR. SONNENBURG (Berlin) observed that notwithstanding the laudable efforts of Dr. Wilms, the surgical treatment of obstipation and its complication is still upon an uncertain foundation. Mobile cæcum is not frequent, by itself not pathological, and the methods of anchoring it vary considerably. The diagnosis by the X-ray picture is not trustworthy, as the form, location, and distribution of the bismuth cæcal shadow depend entirely upon how soon after the ingestion of the mixture it is observed. The accumulation in the beginning of the large intestine in itself is not pathological. The findings mentioned by Wilms can be observed in other forms of obstipation as well as in healthy individuals. The quality and the quantity of the ingested substance must be borne in mind in order not to confound physiological with pathological phenomena. Cæcum mobile can be recognized only when clinical evidences are present, pointing to catarrh and inflammation, from the seat of a typhocolitis. Then there are present symptoms of catarrh of the large intestine, with varying obstipation and diarrhœa, accompanied by typhloatonny. Altogether a patient is better off with a cæcum mobile than one with a fixed cæcum. It is difficult to see what advantage is gained by cæcopexy. Unquestionably, many patients who have typhlocolitis are operated upon for appendicitis, which is not present. On the other hand, many of these patients who are operated upon for chronic appendicitis, by their appendectomy are

cured of their typhlocolitis. Typhlocolitis belongs to the domain of internal therapeutics, and only in extraordinary cases is operation called for. It is usually only part of the inflammation of the large gut and the cause is often elsewhere, for example, at the splenic flexure where obstruction is present, with damming back of the colonic contents. We are not justified in making a clinical entity of mobile cæcum and its symptoms, and unless we are more familiar with the physiology of the large intestine than at present, we should avoid shunting, resections, etc. The speaker has not seen much benefit derived from these operations.

DR. KLOSE (Frankfort am Main) said that since 1904 the Frankfort Surgical Clinic has recognized the existence of cæcum mobile as described by Wilms. During this time 154 cases have been operated on, with a complete cure in 89 per cent. Klose does not agree with the stand-point of Wilms that the mechanical interference with the progression of intestinal contents due to torsion of the hepatic flexure plays the greatest rôle in these cases. One gets secondarily hypertrophy and atrophy of the walls, inflammatory changes in the region of the cæcum and ascending colon, as well as chronic torsion and displacement of these organs. The habitual torsion is, according to observations, the most important and frequent cause of acute appendicitis. Cæcal torsion may also give rise to floating kidney and infective pyelitis.

Klose reports experiments on the cadaver to support this mechanical theory. The cæcum and entire ascending colon are fixed to the lateral abdominal wall, in order to prevent rotation. More recently, he has gone so far that, in marked cases of displacements and severe enteroptoses, he has fixed in place the entire large intestine, liver, and spleen with good results. As a result, the neglected field of enteroptosis has been offered relief through surgical treatment.

DR. GOEBELL (Kiel) since 1908 has performed 15 cæcopexies and 3 cæcoplications for cæcum mobile. Only those were grouped under this head in which there was a freely movable cæcum, and where there existed at the junction of the cæcum and ascending colon adhesions with occasional kinks.

The cæcopexy was done by sewing the lateral band to the transverse fascia by means of silk thread. Only when the caput coli was very distant from the ilio-cæcal junction, after doing

an appendectomy, a plication of the cæcum was performed. Of 15 operated patients, 10 were entirely cured. Good results were obtained only when the cæcum mobile was the primary cause of the obstipation.

DR. DREYER (Breslau) stated that in order to clear up the doubtful subject of cæcum mobile, two questions must be answered:

(1) Is a mobile cæcum pathological? (2) Does the Wilms cæcopexy restore the physiologic condition?

In answer to the first question, he notes that out of a large number of autopsies he has found in 67 per cent. a movable cæcum. It seems scarcely possible that this condition can be pathological and, as Wilms states, the primary cause of obstruction. In answer to the second question, all know that the pregnant uterus in its rise displaces the entire intestines upward. In the latter months of pregnancy, the cæcum is found far above a line joining the anterior superior spines of the ilium.

With the Wilms cæcopexy, the head of the cæcum is fixed deep in the pelvis so as to reach the outlet, in order that, as Wilms describes it, the retroperitoneal pocket shall take up all of the "long" movable cæcum, so that no kinking can take place. The danger here is, that during pregnancy a loop is formed, with the ilio-cæcal valve as the angle and the intestine as the parallel arms. This would make great difficulty for the passage of fæcal matter. It is interesting to note that of the 52 cases Wilms has operated on for cæcum mobile 75 per cent. were in women. In the autopsy room only 11 per cent. of women were found to be free from cæcum mobile, but never was the cæcum fully movable to the site of a possible cæcopexy. The clinical relation of cæcum mobile to chronic appendicitis is not yet sufficiently clear.

DR. FROMME (Berlin) said that anatomical observations and investigations regarding the anatomy of the cæcum during pregnancy had taught him that this organ, as Dr. Dreyer has explained and as is pictured in Corning's Atlas, is during the latter half of pregnancy displaced upward to a marked degree. The pain in the right side, of which many women complain during the latter half of pregnancy, and which is thought to be due to chronic appendicitis, is in his opinion nothing else but the contraction pain caused by traction on a cæcum that is firmly fixed. There must exist a movable cæcum in women to some extent. On the other

hand, a too movable cæcum is exposed to the danger of rotation on its own axis as soon as the uterine pains set in. Such cases of volvulus at the termination of pregnancy are reported more frequently now, he, himself, having seen one such case in 1903.

DR. VOELKER (Heidelberg) said that the introduction of the subject of cæcum mobile by Wilms is welcome to all surgeons who have been dissatisfied with the treatment of and indications for chronic appendicitis; and it is interesting because, besides the schematic and unsatisfactory removal of the appendix, other therapeutic measures are available. The point that is not clear is whether the pain is due to abnormal mobility of the cæcum (Wilms) or to a dilatation (typhloaton, Fischler). The treatment differs according to the view accepted.

In fixation of the cæcum, one must bear in mind that the cæcum is a hollow viscus. It makes no difference whether the fixation is retroperitoneal (Wilms) or to the parietal peritoneum (Rehn, Klose).

The hollow organs are physiologically provided for changes in size and are naturally movable. One cannot use the same methods as with the solid viscera (kidney, liver, spleen, and uterus).

Most important is the following point: If one finds in cases of chronic appendicitis adhesions resulting from previous inflammatory attacks, joining the intestine and the abdominal wall, the pain is ascribed to this cause. It seems that now, however, an abnormally movable cæcum is just as important a cause for the pain. It is surely a fine point to decide in each case to which group it belongs.

Without much thought and consideration, one naturally comes to the conclusion that where adhesions exist to remove them, and where they are not present to artificially create them.

If the dilatation is considered the important factor, it seems only fair to remedy this, rather than to fasten the intestine. Voelker recommends that in those cases where the cæcum gives clinical evidences of dilatation to plait it lengthwise (Bircher, *Med. Clinic*, 1910).

After removing the appendix, Voelker sews together the middle and outer bands with a continuous suture for about 8 cm. By this means the anterior portion of the cæcum is invaginated. If the greater part of the cæcum is below,

and if the bands are short, the cæcum can be shortened by the suture. At the same time the space under the mouth of the ileum is lessened and there can result no accumulation of contents. Likewise a partial fixation is obtained, as the anterior portion of the movable cæcum is contracted. On the plaited portion is reflected the posterior surface. This plaiting is indicated only in large dilatations. In 12 cases satisfactory results have been obtained. Especially in one case after the plaiting a previous long existing temperature disappeared. The case is a good example, as the appendix had been removed previously, and the plaiting only was done. Stenosis of the cæcum or ileum can be avoided with care.

DR. STIERLIN (Basel) reported the after results of three cases of shunting of the cæcum and ascending colon for severe obstipation of the ascending type. Two of these cases were operated by Prof. Wilms and the third by Prof. de Quervain. In the three cases, before the operation, the bismuth shadow persisted for 24-48 hours in the cæcum and ascending colon and lower down in the intestine in the form of fecal masses. After operation no shadow is visible after 24 hours. Disregarding the X-ray pictures, the clinical results are satisfactory. In all the cases the obstipation has disappeared, the patients having daily movements. In the case operated upon by de Quervain, the plication of the shunted colon was done, making it very narrow at the hepatic flexure to allow for drainage of its secretion, yet permitting no return flow of the fæces.

The indication for shunting as well as the improvement after operation was shown by the X-ray pictures.

V. ON INTESTINAL COMMUNICATIONS WITH THE BILIARY PASSAGES AND THE PANCREAS.

DR. KAUSCH (Berlin) reported as follows: 1. *Cholecyst-enterostomy*: With the results of this operation he is not satisfied, although an entero-anastomosis was always performed in addition. He lost several patients through cholangitis. Kausch therefore advises, if it is possible, to perform cholecystogastrotomy or duodenostomy, the former being recommended especially by Hildebrand.

But not in every case will it be possible to avoid cholecyst-enterostomy. Under such conditions Kausch proceeds in the

following way: in the first place, an entero-anastomosis is performed; the side-piece of the intestine which leads away from that point is cut through close to it and both ends closed. The longer one is connected with the gall-bladder, and this part of the intestine changed into a narrow canal by continuous suture of the serosa.

2. *Hepatocholangi-enterostomy*: This operation has the simpler name hepato-enterostomy. Kausch always performs it now in two intervals, hepatostomy first. His reasons are: (a) if the operation is not divided into two parts, the strain is too great; (b) it is harder to stop hemorrhage; (c) one never knows whether, after the relief of the liver, the physiological passage will not become free and the major operation be rendered unnecessary. It is best to enter the liver from the gall-bladder, and afterwards to connect the latter with the intestine.

3. *Formation of a new biliary duct*: This operation may sometimes become necessary, and the several procedures of this kind have already been described. Kausch gives the advice to form the new biliary duct out of the intestinal wall by plastic operation, as it is described in the *Zentralblatt für Chirurgie*, 1911, p. 159. The patient thus treated was entirely cured; the operation was done half a year ago.

4. *Intestinal communication with the pancreas*: It is easy to extirpate the tail of the pancreas, yet more difficult to do so with the central portion. The removal of the head of the pancreas involves the greatest difficulty, particularly because of the connection of the rest of the pancreas with the intestine. Simple implantation of the duct is unsafe, because the broad surface of the incised pancreas is secreting. In one case of papillary carcinoma Rausch removed the head of the pancreas and turned the transversely bisected duodenum over the incised surface of the pancreas. The case is described in the *Zentralblatt*, 1909, p. 1350. Nine months after operation patient died from cholangitis. The postmortem showed that intestinal communication with the pancreas was working excellently; nowhere any metastasis.

URINARY ORGANS.

I. ON THE PATHOGENESIS OF RENAL TUBERCULOSIS.

DR. PELS-LEUSDEN (Berlin) referred to his experiments to produce renal tuberculosis, briefly outlined at the Congress of 1905. The arrangement of the experiments, briefly repeated, was the following: small doses of oily infusions of pure cultures of tubercle bacilli of the type bovinus and of differing virulence were injected directly into the right renal artery of large animals, goats and dogs. The animals died at different intervals or were killed from five weeks to nearly six months after infection. A number of photographs were shown which prove that it is possible by this mode of infection to obtain unilateral renal tuberculosis with certainty in all cases. In using bacilli of very weak virulence, the experimenter succeeded in limiting the tuberculosis to the right kidney which thus represented the only diseased organ. In all cases the presence of the bacilli could be demonstrated in the diseased organs. The pictures shown also prove that the changes thus produced in the kidney may in a large measure correspond to those of the so-called surgical renal tuberculosis. Some pictures specially show very characteristically tuberculosis of the medullary cones. Because of these results, the author considers himself justified to draw the conclusion that the mode of infection chosen by him corresponds closely to that found in human bodies. A detailed discussion will shortly appear in Langenbeck's archives.

A great part of the animals experimented upon died of pulmonary tuberculosis, but only when injected with fully virulent bacilli. The exact examination of the other organs revealed the fact that they were essentially healthy, the left kidney especially was only very exceptionally the seat of some small tubercles.

With regard to the spread of tuberculosis upon the excretory (deferent) urinary passages, the author has not yet arrived at a definite conclusion. He did obtain in some cases very fine tuberculosis of the renal pelvis. He also observed the spreading of material containing tubercle bacilli into ureter and bladder. But in both of the latter organs were found only symptoms of inflammatory irritation, which, to be sure, prepare the ground for subsequent infection. Only in one case at the vesical orifice of the right ureter, therefore on the infected side, there was an

entirely fresh tubercle with numerous bacilli, while the other portions of this ureter, the left ureter, and the other part of the bladder were positively free from tuberculosis. This is possibly to be understood as an incipient descending infection.

The preliminary conditions for the success of the experiment in the opinion of the author are the following: (1) one must choose large animals, goats, sheep, dogs; (2) one must introduce the material containing the bacilli immediately into the renal artery; (3) the bacilli used must have but a mild virulence, hence bacilli of the type *humanus* are perhaps more to be recommended, as they are usually not so virulent for animals as those of the type *bovinus*; (4) these bacilli must be injected in very small quantities only; (5) one must, by infusing the bacilli in oil or by adding other substances, such as lycopodium, which cause a slight embolus, force them (the bacilli) to remain longer at one point of the system of renal vessels.

The conclusions which the author draws from these experiments and from investigations already previously published, together with (Privy-Councillor) Koenig, are the following:

1. The chronic, unilateral renal tuberculosis is in the vast majority of the cases a hæmatogenous one (Baumgarten).

2. It is caused by small emboli containing bacilli (small particles of tissue, fat drops, etc.) which eventually have passed the pulmonary capillaries. This is a regular occurrence in the case of fatty emboli, for instance.

3. Individual bacilli circulating in the blood pass the renal circulation without bad effect.

4. The differences between his results and those of Friedrich, who on introducing bacilli of weak virulence into the blood circulation could not produce any essential renal tuberculosis, but on the contrary on using bacilli of full virulence found the kidneys to be the most diseased organs, are explained in part by the different arrangement of the experiments (cf. the article in Langenbeck's Archives).

5. In the case of severe cheesy (caseous) renal tuberculosis with obstruction of the collective canaliculi, the tubercular process may spread backward by means of the uriniferous tubules. To the best of the author's knowledge, this explanation was first given by himself and was later on accepted by Kuester and J. Israel.

6. The theory, advanced by Tendoloo and accepted by Brongersma, that tuberculosis of the renal marrow arises in lymphatic ducts, is to be considered as yet unproved.

7. The mode of infection hitherto mentioned is also to be recommended for the experimental investigation of tuberculosis of other organs, especially if one wants to undertake therapeutic experiments.

BLOOD-VESSELS.

I. SAPHENOFEMORAL ANASTOMOSIS, TRANSPLANTATION OF THE VENA SAPHENA INTO THE VENA FEMORALIS BY MEANS OF VASCULAR SUTURE, AS AN OPERATIVE METHOD OF TREATMENT.

DR. WILHELM SCHAACK spoke on the theoretical part with anatomical investigations; DR. ERICK HESSE on the clinical part.

The operative methods of treating varices used until now do not give ideal results nor do they protect against relapses. It is comprehensible, therefore, that new methods are being sought for.

In 1906 Delbet advised a new operative procedure for a certain group of varices which by means of *transplantation of the vena saphena into the vena femoralis at a new place by vascular suture produces normal physiological conditions for the venous blood circulation.*

For a certain large group of varices the static and mechanical factors are of prime importance etiologically. Furthermore, the condition of the valves in the diseased veins and their insufficiency are of great importance. The abnormal reflux of venous blood which can be observed in Trendelenburg's experiment can be explained only by insufficiency or absence of valves. To prevent abnormal reflux, ligature was proposed by Trendelenburg. This operation, however, can give good results only when sufficient anastomosis exists between superficial and deeply situated veins. Anatomy teaches that such anastomoses do not exist in sufficient number nor in the required grouping. These unfavorable conditions may be changed, if the recurrent blood wave is stopped and the engorged blood is allowed to flow off. Delbet says he accomplishes this by transplanting of the vena saphena into another vein with valves capable of functioning normally.

In the vena femoralis below the original junction with the saphena there is always a great number of valves. If the vena saphena is transplanted below such a pair of valves, the abnormal pressure from above can be checked by means of the interpolated valve. Furthermore there is the possibility of a normal deflux (discharge) through the newly constructed anastomosis. The operation is performed briefly as follows: longitudinal section in Scarpa's triangle, exposition, isolation and mobilization of the vena saphena and femoralis. The vena femoralis is grasped 12 cm. *below* the mouth of the saphena with two vascular clamps, and the bisected vena saphena is implanted by means of a vascular suture into a longitudinal section, about 0.5 cm. long made in the vena femoralis—an end-to-side anastomosis between the vena femoralis and the vena saphena. Hesse and Schaack executed the saphenofemoral anastomosis in 23 cases in the surgical division of Prof. Zeidler in the Obuchow Hospital in St. Petersburg.

To justify performing this new operation, one must be sure that the valves mentioned are present in the vena femoralis. As no definite statements are to be found in anatomical literature about the distribution and situation of the valves of the veins in question, these investigations were executed by the authors in the pathologic institute of the Obuchow Hospital. One hundred corpses were examined, of which an equal number of anatomical preparations of the vena femoralis together with the vena saphena was taken. The relations of the valves and their distances upward and downward from the issue of the saphena into the vena femoralis were noted. Of the facts thus established the most important with regard to saphenofemoral anastomosis is that in the vena femoralis there are *always pairs of valves below* the mouth of the saphena, at least one pair in each case, but in most cases (73 per cent.) two to three and even more. In rare cases the first pair of valves in the vena femoralis is found but 7 to 10 cm. below the inosculation of the saphena, in the majority of cases only 3 to 4 cm. below. It follows, therefore, that the new anastomosis must be made 10 to 12 cm. below the inosculation of the saphena.

The vena saphena implanted 10 to 12 cm. below its original junction is now *under protection of a pair of valves*. The recurrent blood wave is stopped by the pair of valves. Further-

more, the veins can empty normally upward through the anastomosis. Experience proves that the dilated veins, when liberated from abnormal pressure, can resume their normal size. The height of the blood-pressure in the dilated venous sphere of the saphena becomes comprehensible, if one realizes that a blood column, commencing from the vena cava, the vena iliaca, and the vena femoralis, presses upon the wall of the saphena; this blood column, in consequence of the insufficiency of the valves, is checked at no place in its course.

This valvular insufficiency, which is of great importance etiologically in a certain group of varices, can be removed by saphenofemoral anastomosis. Hence this operation must also provide a radical cure for those cases of varices which are due to this valvular insufficiency.

Clinical Observations.—Since Delbet published, in 1906, the first communication on the practical application of his method in eight cases, nothing had been reported by other authors about this operative procedure. It was the authors' intention to examine Delbet's theoretical considerations, which were undoubtedly correct, although yet not tested with regard to their surgical value at the hand of material at their disposal.

They performed saphenofemoral anastomosis by means of the vascular suture in 23 cases at the Obuchow Hospital for men in St. Petersburg.

Of these cases 9 were operated by Schaack, 11 by Hesse and 3 by other surgeons.

As Prof. Delbet informs the authors by letter, 25 cases in his clinic have so far been operated upon successfully in accordance with the above principles. Thus,—as far as they are aware,—a total of 48 saphenofemoral anastomoses have been performed to date.

It should be said that in the majority of cases the patients operated upon were affected with a strongly pronounced complex of varicose symptoms. In several cases racemose masses and bundles of dilated veins were present.

Of their 23 patients, 16 at the same time had ulcers of the leg.

The chief incision is made in Scarpa's triangle in the direction of the large vessels. The vena saphena, after being exposed in the region of the incision, is mobilized sufficiently to allow anastomosis to be applied without any tension.

If lateral branches of the saphena are found they must be ligated. The same holds good for accessory saphenas. Thereupon, the saphena to be anastomosed is ligated as high as possible. From experience the authors know that this place of ligation is situated about 4 to 5 cm. below its inosculation with the vena femoralis. After applying a Hoepfner's vascular clamp to the peripheral end of the saphena, the latter, in order to allow of an easier performance of anastomosis, is cut through obliquely. Then the femoral vein is isolated for a distance of 5 to 7 cm. from the femoral artery. After that both its ends are closed temporarily by Hoepfner's clamps. Then the vena femoralis is opened according to the lumen of the saphena and the continuous vascular suture follows a real side-to-end anastomosis. Thereupon the clamps are slowly loosened. In most cases a small hemorrhage now occurs in the stitch canals which stops after some compression. In five cases they witnessed a stronger bleeding, so that they had to proceed to supplementary sutures.

Then the region of the anastomosis is covered by one or two interrupted silk sutures, which grasp the sartorius and adductor muscles. Now follow skin suture, dry dressing, and immobilization in a wire splint which remains two or three weeks.

According to their experience and investigations on cadavers it is sufficient to apply anastomosis about 12 to 14 cm. below the physiological inosculation of the saphena, which would correspond to a distance of 20 to 25 cm. from Poupart's ligament. In applying anastomosis at this height, one may be sure of having implanted the saphena below one or two working valves.

In 22 cases a wholly undisturbed healing process took place.

In one case a severe wound infection occurred to which patient succumbed on the twenty-sixth day after the operation. The first seven days in this case passed without any reaction; then only the temperature began to rise, and on the ninth day streptococci in the general circulation could be demonstrated. Later a general infection set in with metastases, originating from a purulent thrombophlebitis of the saphena and femoralis. The cause of the infection cannot be stated with certainty; the possibility of infection from non-sterile silk used for the vascular suture is at all events to be considered.

This case, although regrettable in itself, cannot be laid against the method as such. On the other hand the great danger from

this interference with the blood-vessels is evident because of the possibility of the infection being directly transmitted to the general circulation.

All of the other cases could be dismissed with wounds which had healed primarily.

In regard to results, they were thoroughly satisfying.

To be sure, one cannot expect absolute disappearance of the varices in the beginning. For the authors did not cut away the diseased veins; they were forced to act normally. In consequence it cannot be expected, of course, that large, dilated veins disappear in a trice. Only after longer observation shall we be able to notice a diminution and disappearance of the varicose dilations.

The most important and above all the most conspicuous phenomenon which must appear after the saphenofemoral anastomosis is the disappearance of Trendelenburg's symptom, previously present. If negative reaction occurs, it only proves that between the saphena and the whole ascending venous territory one or more working valves have been inserted. Consequently the anastomosis has fulfilled its purpose.

In all the cases it was possible to demonstrate the disappearance of Trendelenburg's symptom, which was positively present before.

A second condition which we must require of a successful anastomosis is that it allows free passage. The cases operated upon demonstrated this point also sufficiently.

As to the effective results, the authors could ascertain in all their cases a diminution, even repeatedly a complete disappearance, of the varices. In every case the ulcers which had hitherto defied every treatment healed. Even in an especially obstinate case of circular callous ulcer, full cicatrization could be observed in 25 days in connection with the anastomosis.

Edema was never observed. Subjective troubles, such as cramps, pains, and fatigue in the legs, also disappeared.

As to lasting results, Delbet's observations on 25 cases are very satisfactory. Their observations are at first of too short duration to allow conclusive judgment. Hesse wished to mention briefly that they were able to follow several cases for one year with excellent results.

The procedure is indicated: (1) for strong and otherwise

healthy persons; (2) only in the case of valvular insufficiency of the saphena, when the indicator of the insufficiency, Trendelenburg's symptom must give a positive reaction; (3) the varices must be situated within the range of the vena saphena magna; (4) their trunk must allow of free passage.

This method is contraindicated: (1) for sick and weak persons; (2) if the varices did not originate through valvular insufficiency, *i.e.*, if Trendelenburg's symptom is negative; (3) in the case of inflammation and thrombosis of the vessels to be anastomosed; (4) if the varices are not situated in the region of the saphena magna; (5) in cases in which an infection of the lymph passages of the thigh can be assumed, for instance after recovery from several attacks of erysipelas, in the case of dirty, inflamed ulcers, etc.; (6) in too strongly sclerotic changes of the saphena and femoralis; (7) in case of too small a calibre of one of the two vessels. Large, even circular ulcers should not be considered as a contraindication, as their material demonstrates.

What objections may be raised against saphenofemoral anastomosis?

1. *The dangers which result from the vascular suture.*

In the first place the greatest danger in this connection is that of primary infection and of the quick entrance of the infecting germs into the general circulation.

The objection to the method which the danger involves, is certainly possible. In fact, a case was lost in this way. But this one case does not offer conclusive proof. All the other 47 cases which took a favorable course are a splendid counter proof of the innocuousness of this method.

In the second place *emboli* are theoretically to be considered. The possibility of such a complication is theoretically to be conceded, and the material of 47 cases hitherto operated upon which developed favorably may still be too small to allow of concluding that emboli do not occur. But on the other hand, pulmonary emboli take place in connection with ligations and resections of the saphena, so that the danger of a pulmonary embolus, therefore, is not at all especially restricted to saphenofemoral anastomosis.

2. *The disproportion of the slight ailment with the extremely difficult interference.*

This is without question the most serious objection. On the

other hand, the suffering of patients afflicted with varices lasting for years is not at all thought of too slightly. Furthermore, all other methods of operating show relapses in a certain number of cases, and therefore the search for a new physiological procedure is quite comprehensible.

It is in the saphenofemoral anastomosis that we possess the first step to an operation which is intended to create physiological conditions, and therefore a trial of this method is justified.

Should the future confirm the permanency which present results promise, then saphenofemoral anastomosis has justified itself.

DISLOCATIONS.

I. THE REPOSITION OF INVETERATE TRAUMATIC LUXATION OF THE HIP-JOINT.

DR. JULIUS DOLLINGER (Budapest) reported results obtained in the treatment of 22 inveterate traumatic luxations of the hip-joint. Of these he set by the bloodless method four lux. iliaceæ of 4, 6, 8, 9 weeks' standing and one lux. sciatica of 7 weeks' standing. Besides this he tried bloodless setting in other cases, but without success. The subsequent arthrotomy showed contusions and abrasions of the head of the femur. Therefore Dollinger later on employed the bloodless reposition only in those cases which showed a certain motility. In 17 cases he performed arthrotomy. Here he gave his chief attention to those pathologico-anatomical changes which prevent reposition. These should be read in the original paper, which will soon be published in the *Ergebnisse der Chirurgie*, vol. iii, Payr-Kuettner.

The essential changes are:

1. *Changes at the acetabulum.* It was in every case, except one, filled with connective tissue that consisted of shreds of the capsule and of fat, and had grown firmly together into one lump. This mass clung so closely to the acetabulum that it could be removed only with great difficulty and had to be cut out piece by piece. Underneath it the cartilaginous cover of the acetabulum was intact and eroded only in cases of very long standing.

In seven cases there was fracture of the acetabulum, in two cases of the pelvis.

Reposition is only possible when the acetabulum is empty. The bloodless operation could have been performed only in one case out of the 17.

2. *Changes in the head of the femur.* In a case 9 months old the caput femoris presented a gnawed-like appearance at the perichondrium. In some cases, in which attempts at reposition had preceded, it was crushed or excoriated, otherwise mostly intact or little damaged. In its new position it was surrounded by periosteal neoplasma which formed a wall around it. The collum femoris was in most cases attached to the pelvis by cicatricial tissue.

3. *The articular capsule* could not be dissected free from the cicatricial mass, nor could one ascertain whether the capsular rupture was really constricted.

4. *The muscles* whose insertions had approached each other were shortened. This contraction, however, was overcome by manipulation or by means of a block-and-pulley. Exposition of the bone was not necessary in any case. Only in one case the pyriformis and obturator internus, with the gemelli muscles, were cut through. Otherwise the muscles were kept intact. The quadratus femoris muscle was intact only in one case, otherwise always torn apart. The important rôle played by the pyriformis, obturator and gemelli muscles with regard to different luxations has hitherto not been studied in sufficient detail by surgeons. It is of great consequence and will be specifically referred to later under several forms of luxation.

Arthrotomy.—After different sectional methods Dollinger decided on an incision which runs from the spina posterior inferior to the base of the trochanter major.

Luxatio Iliaca.—The head lies under the gluteus magnus muscle. Its communications as well as those of the collum femoris with the pelvis are cut through. The neck and the shaft of the femur bar the way to the acetabulum. By means of flexion and strong inward rotation of the thigh this way is cleaned. Now the acetabulum is still covered by the pyriformis, obturator internus and gemelli muscles, which, because of their great tension, were regarded by the author as cicatricial masses. These were pulled upward. Then, illuminated by the electric frontal reflector, the acetabulum is cleaned and then, by means of circumduction, reset by manipulation, if possible. But every-

thing necessary for using the block-and-pulley must be applied to the patient beforehand. He remains in a lateral position, and the pull is exerted when the thigh is flexed 90° , as in the case of reposition by means of elevation. Dollinger performed 8 arthrotomies on account of luxatio iliaca; of these he set 7; in one case in which an attempt at bloodless reposition had been made before, the head was crushed and partially denuded from cartilage. In this case resection was performed.

Luxatio Sciatica.—The head lies under the acetabulum, the access to which is closed by the aforementioned four muscles. These must be loosened from the acetabular margin and pulled upward. Now the acetabulum is emptied, then or even before the connections of the head and the neck loosened, the thigh bent and greatly abducted, whereupon the head leaves the wound and enters the acetabulum. If this is not the case, the luxatio sciatica becomes a luxatio iliaca, to set which circumduction should be used. All manipulations for reposition should be performed by a special assistant under the direction of the operator. The latter should not perform them, even in part.

Three cases out of four were set; one of $3\frac{1}{2}$ months' standing was resected on account of changes of the cartilaginous cover of the acetabulum and of the head.

Luxatio Obturatoria.—Access to the acetabulum is covered by the point of the trochanter and the before-mentioned muscles. These are to be pulled downward. The acetabulum is then emptied. Access to the head is blocked by the trochanter major, but is made possible by flexion and inward rotation. If the head is fixed firmly, an incision should be made from below directly to the head and the latter liberated from its adhesions through this incision. The incision should be sutured without drainage on account of the vicinity of the anus.

Then reposition should be performed as in the case of luxatio sciatica.

Two cases out of five were resected. In one case only osteotomy was performed. In this case hard, large masses of callus were present. In two cases reposition was made.

Hence, of the 17 cases treated by arthrotomy, four were resected, on one osteotomy was performed and on 12 reposition. Only one case died on which resection had been performed. This case was complicated by fracture of the collum femoris

and by the presence of a great amount of callus, from which a diffuse hemorrhage occurred during operation. Patient succumbed on the next day in consequence of anæmia. All others recovered.

In five of the 12 cases on which reposition was performed suppuration developed, on account of which the head was subsequently resected. In one case in which suppuration developed likewise, recovery took place later, but suppuration reappeared several times subsequently. In six cases immediate and permanent recovery took place *per primam intentionem*. The great number of suppurations was the consequence of the fact that in the first cases a long search was still necessary for purposes of orientation and that these operations were thus very much protracted. The same unsatisfactory conditions used to obtain with regard to inveterate luxations of the shoulder. Now that the reposition of any kind of luxation has become, so to speak, a schematic operation, because of our knowledge of the above-mentioned pathologicotopographical relations, it will certainly be possible to guard against sepsis.

The Final Results.—In October of last year all those who had been operated upon were summoned for examination. Of those whose wound had healed smoothly, only three appeared. A boy of 8 years with a luxatio iliaca of $3\frac{1}{2}$ months' standing showed the best results. Three and a half years later all motions in the reset joint were just as free as in the sound one.

In the case of a man 52 years old whose luxatio iliaca was of 2 months and 1 week's standing, flexion was possible up to 85° , abduction up to 10° , inward rotation up to 20° , outward rotation, as in the case of the sound leg, up to 47° , $1\frac{3}{4}$ years after reposition. The motions within the limits required for walking were comfortably possible, and therefore the gait was normal.

In the case of a luxatio iliaca 1 month old, flexion was possible up to 140° , abduction and adduction only slightly, outward and inward rotation within about half of the normal limit 5 years after reposition. The gait of the patient was entirely normal.

But two patients came to the examination whose cases are extremely important. One was that of a man of 59 years whose luxatio iliaca of 9 months' standing had been set with block-and-pulley by the bloodless method 9 years and 8 months previously.

An arthritis deformans gradually developed. About half of the caput femoris has already been ground off. In walking he limps badly. The second case is that of a man of 42 years with luxatio publica whose luxation of one month's standing was set 3 years ago by circumduction. Massage and gymnastics were begun at once. Three years later, when patient appeared for examination, the set joint was entirely stiff when flexed at an angle of 160° under slight abduction. An X-ray photograph shows the head in the acetabulum. On it a shadow 1 cm. broad due to osseous fibulæ connects the minor as well as the major trochanter with the pelvis.

Hence it is evident that ostitis deformans and also osseous stiffening may arise not only after bloody but also after bloodless reposition.

Dollinger declares himself to be a decided advocate of bloody reposition in the case of inveterate traumatic luxations of the hip-joint, as it has been greatly simplified by his investigations and has, in its essential features, become a schematic operation. The severance of the muscles and the exposition of the bone are unnecessary and should therefore be avoided.

EDITORIAL NOTE

THE INTERNATIONAL SOCIETY OF SURGERY.

THE announcement that the next meeting of the International Society of Surgery will be held in New York renders the character and work of this society of immediate interest to American surgeons.

The Third Congress of the society has recently been held in Brussels, under the Presidency of M. Lucas-Championniere of Paris. *The Journal de Medicine et de Chirurgie* for October 25, 1911, contains an account of the society and of its recent session, written by its President, which is the source of the information contained in the present note.

The International Society of Surgery is a society, the membership of which is restricted to a selected list of eminent surgeons from each of the States of Europe and of America. It differs in this respect from other well-known general congresses to which membership is open to all who may care to subscribe. The society was organized ten years ago to meet every three years.

Dr. Championniere states that Dr. Keen, of Philadelphia, had been one of the most influential advocates of the organization of this society. Of the various motives which prompted him to advocate the creation of this society, the following were particularly taken into consideration, viz: That after having taken part in the great general international congresses, it had seemed to him that surgery was somewhat lost in them and that, as these congresses were open to all, a large number of various communications, emanating often from physicians of little surgical experience, or being published with an object hardly scientific in character, were admitted and the seances were prone to be embarrassed to such a degree that the over-weighted programs of these congresses could not be carried out. In fact, together with publications of the highest value, were to be found many dictated to secure some personal end, rather than to make known true scientific progress. Dr. Keen found many to share his opinion

among those from all countries who had frequented the great congresses. He found especially a large number of the members of the Surgical Society of Belgium quite ready to second him in the formation of an International Surgical Society, especially M. Verneuil, who was the first Secretary General of the society; and M. Willems, of Gand, who has been the President of the International Executive Committee of the society. Also M. Depage, who, after having been during two sessions a most active Secretary General of the society, and after having given an extraordinary impulse to the development of the society and having contributed brilliantly to the success of its meetings, has just been nominated President for the next meeting, and finally, M. Mayer, who after having given most valuable assistance to M. Depage, has just succeeded him as Secretary General. Nor should M. Lorthioir, the Treasurer, be overlooked, who has fulfilled his difficult task with great assiduity and abundant success.

The number of members assigned to each country is not very great, compared to the number of surgeons in such countries, and new nominations can be made only to fill the places of members deceased or who may have resigned. Nominations are made for presentation at a general assembly of the society in congress, by the voice of the members of each nationality present.

The President of the society at its first session was Professor Kocher, of Berne; the second was Professor Czerny, of Heidelberg. At the last session the President was M. Lucas-Championniere. These three sessions have all been held at Brussels. The next session will be held in New York in 1914, under the presidency of Professor Depage, of Brussels.

At these congresses individual communications are not made according to the pleasure of each. Important questions are determined upon in advance. Reporters upon these questions are nominated from different countries and the discussions are allowed only upon those questions. This manner of organization has for its end to bring before the society the study of certain great questions set forth in the program, and the prevention of any undue diversion of the attention of the society by allowing matters of a multiform variety to be discussed. Nevertheless, at the two last sessions in order to give a greater variety to the materials presented, an exposition of pathological specimens has been added by the committee to the questions per-

mitted in the general assembly. The first exposition conducted under the inspiration of Dollinger of Budapest was consecrated to cancer. During the last session, an exposition pertaining to fractures was highly successful and at the next, will be organized an exposition devoted to prosthesis after amputation.

The questions to be considered at the New York congress will be: (1) The Surgery of Gastric and Duodenal Ulcer; (2) Grafts and Transplantations of Organs; (3) The Technic of Amputations; (4) The Treatment of Tetanus.

At the congress just passed the questions were as follows:

(1) Pulmonary Surgery; (2) The Diagnosis and Treatment of Colitis; (3) Pancreatitis.

Among those selected to report upon the first series was the late Dr. Ferguson, of Chicago. His paper upon "Parasites and Tumors of the Lungs" was completed by him shortly before the development of the illness which prevented his attendance at the congress, which illness terminated fatally at nearly the time when he should have presented his paper.

Among those selected to present papers treating upon the subject of the second class was Dr. Gibson, of New York, to whom was assigned the theme of "Surgical Treatment of Colitis." The paper by Dr. Gibson appears in another portion of the present number of the *ANNALS OF SURGERY*.

The papers upon pancreatitis were by Dr. Michel, of Nancy, Dr. Giordano, of Venice, and Dr. Körte, of Berlin. Of these papers very great importance must attach to the observations of Dr. Körte, whose paper may also be found in the preceding pages of the present number of the *ANNALS OF SURGERY*.

Dr. Lucas-Championniere speaks particularly of the great hospitality exhibited by the Belgians at the meetings which have thus far been held at Brussels. In addition to special receptions of many kinds, Prince Albert, the actual sovereign of Belgium, opened the first session of the congress in 1908, and at the last session the Minister of the Interior presided. The Burgomaster of Brussels, M. Max, also honored the seance with his presence, and later received the society at the wonderful Hotel de Ville of Brussels. Such fêtes given to a society whose numbers are restricted have a tendency to very closely bring together the surgeons from every country. Besides this, the number of ladies participating in these fêtes and at the public meetings has been

considerable and has lent a peculiar attractiveness to them. These reunions have certainly contributed to progress, for it is of great advantage to know personally those whose writings one has read or whose practice one has occasionally met with. Dr. Championniere adds that he believes his own personal education has been greatly indebted to relations thus established, and he extends the wish that the success of the International Society may for the future increase opportunities for personal acquaintance among surgeons of every nationality.

LEWIS S. PILCHER.

TO CONTRIBUTORS AND SUBSCRIBERS:

All contributions for Publication, Books for Review, and Exchanges should be sent to the Editorial Office, 145 Gates Ave., Brooklyn, N. Y.

Remittances for Subscriptions and Advertising and all business communications should be addressed to the

ANNALS OF SURGERY,
227-231 South Sixth Street,
Philadelphia.